

HUNTING WILD LIFE WITH CAMERA AND FLASHLIGHT

GEORGE SHIRAS, 3^D



VOLUME I

HUNTING WILD LIFE WITH CAMERA AND FLASHLIGHT

A Record of Sixty-five Years' Visits to
the Woods and Waters of North America

By

GEORGE SHIRAS, 3^D

With 950 Photographs by the Author

Volume I

Lake Superior Region



NATIONAL GEOGRAPHIC SOCIETY

WASHINGTON, D. C.



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A DOE AND HER TWIN FAWNS FEEDING ON A LAKE IN NORTHERN MICHIGAN

Photograph by George Shiras, 3d

This picture, with three others by Mr. Shiras, was exhibited at the Paris Exposition by the United States Government, and received the Gold Medal. It was again exhibited at the World's Fair in St. Louis, receiving the Grand Prize. This series of pictures was the first to attract general attention throughout the world to the possibility of animal photography at night.

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This publication of the important wild-life researches of George Shiras, 3d, is made by the National Geographic Society as a contribution to its purpose—the increase and diffusion of geographic knowledge.

Foreword

By EDWARD W. NELSON

Formerly Chief of U. S. Biological Survey

GEORGE SHIRAS, 3d, has become one of America's most widely known and appreciated field naturalists. For more than 60 years he has been visiting wilderness haunts and recording his observations in articles illustrated with his own remarkable photographs of wild life. His work, most of which has appeared at intervals in the NATIONAL GEOGRAPHIC MAGAZINE, has such extraordinary scientific, historic, and popular value that the National Geographic Society decided to assemble his contributions in these volumes for convenient use.

For this purpose Mr. Shiras has revised and largely rewritten all his important popular articles and has added much new material, both in text and photographs. The present volumes, therefore, embody the best and most interesting field results of a lifetime's work with notebook and camera among wild things in many parts of North America.

George Shiras, 3d, was born in Pittsburgh in 1859. He received his preparatory education at Phillips Academy, Andover, Massachusetts. In 1881 he was graduated at Cornell University, Ithaca, New York, and in 1883 completed the law course at Yale.

After this he practiced law at Pittsburgh with his father, George Shiras, Jr., until the latter was appointed an Associate Justice of the United States Supreme Court by President Harrison. This change resulted in the younger man's assumption of his father's law business in 1892 and in his becoming the senior member of the law firm of Shiras and Dickey, in which he continued until he retired from practice.

During 1889-90 he was a member of the Pennsylvania Legislature and in 1903-05 a member of the Congress of the United States.

The photographic field studies of George Shiras are world-famous. They have had a far-reaching influence in developing in others a love for the out-of-doors and for the denizens of wild places.

PIONEER FOREBEARS KNEW AND LOVED THE WILDERNESS

The spirit of adventure and love of the wilderness and its inhabitants that led directly to Shiras' development as a field naturalist undoubtedly came to him through a combination of heredity and environment. His paternal great-grandfather, George Shiras, was born in Mount Holly, New Jersey, in 1773; he went in 1790 to Pittsburgh, where later he married a sister of Commodore Perry, the hero of Lake Erie.

At that early period and for a long time afterward the region about Pittsburgh was, to a great extent, a wilderness; and this newcomer became a notable hunter and fisherman, delighting in his unspoiled surroundings. He showed his tastes and his adventurous disposition in 1811 by putting the first steamboat on the Ohio and its tributary headwaters. It was a

small craft, which he christened the *Izaak Walton* and which he and his friends used for fishing in the local waters.

Shiras' paternal grandfather, George Shiras, born in Pittsburgh in 1805, was also a lover of the out-of-doors, being especially devoted to trout fishing. Having heard marvelous tales of the fine speckled trout along the south shore of Lake Superior, he went there in the summer of 1849 and established vacation headquarters at the village of Marquette.

This was before locks had been built around the Sault Sainte Marie, and only a few scattered settlements existed in the entire region. The excellent sport he enjoyed and the beauties of the primitive wilderness lured him back each following season until his 89th year.

In 1859 George Shiras, Jr., the father of George Shiras, 3d, made his first trip to this fisherman's paradise. Like his father, he was delighted with the country, to which thereafter he made yearly pilgrimages until he was 92 years of age.

When George Shiras, 3d, was eleven years old, in 1870, he was first taken to Marquette by his father. Since that time until the present he has visited that city annually.

As a boy and youth he reveled in the freedom of life in a vast wilderness area of unspoiled beauty and great natural charm. There were the scenes of his youthful adventures in primitive forests, among unfrequented glades, along the banks of little-known streams and lakelets, or on the beaches of the sealike expanse of Lake Superior.

There he married the daughter of Peter White, a noted pioneer of northern Michigan, and there were born his two children, a son and a daughter. The son, George Shiras, 4th, like his father, in early life developed a deep love for wild places and became a devotee of the rod and gun and a skillful photographer. His untimely death broke the family succession and ended the promise of a brilliant career.

GUN GIVES WAY TO CAMERA

During his earlier years the interests of George Shiras, 3d, were those of a keen hunter and fisherman. By degrees, as he grew older and his viewpoint broadened, he became more and more enthralled by the wild life and the beauties of the region where he had passed so many happy years. By the late 80's his hunting instincts had been more and more subordinated to the sympathetic desire of the naturalist to know more of the lives, habits, and mentality of the wild things he so often encountered.

In looking back over a long life, many can recall apparently trivial occurrences that later proved the most potent elements in directing a subsequent career. Concerning events of this kind in his life Shiras has written:

"Fairly within the realm of romance were my two days' travel on foot, with an Indian guide, when I was twelve years old, through a pristine wilderness to a beautiful little lake hidden in the forest about twenty

miles east of Marquette. The lake had been discovered by my guide the year before. I named it Whitefish Lake because a small river of that name entered Lake Superior at a point that made probable its origin in this lake, although this connection was not verified until a few years later.

"To this secluded place I have returned for more than sixty consecutive years, first as a boy and later often accompanied by relatives and friends. The natural beauties of this woodland haven and the interesting wild life inhabiting the surrounding forest undoubtedly had a governing influence in developing my career as a sportsman-naturalist. It was there that, as a youthful hunter, I shot my first deer. There I took my first daylight and flashlight photographs of wild life, and there I became an observing field naturalist.

"Born and reared in Pennsylvania's greatest industrial center, I lived during most of my early years beneath a sun often obscured by clouds of smoke. At night that part of the Ohio Valley resembled an inferno from the glare of blast furnaces, coke ovens, and many standpipes shooting lurid flames far overhead in wasteful consumption of the natural gas from adjoining oil fields.

"The contrast between such surroundings and those of my vacation periods beneath azure skies in a lovely forest retreat sufficiently accounts, I believe, for the overpowering desire that finally caused me to give up the exactions of a professional life that I might be free to interpret the laws of nature rather than those of man."

PERFECTING A FLASHLIGHT "PISTOL"

About 1889 Shiras began to lay aside his gun and experiment with a camera in an attempt to obtain permanent records of some of his woodland friends. As the result of these early and persistent endeavors he became recognized as the father of wild-life photography. He originated and was the first to advocate the pastime of hunting with the camera in daytime and at night.

After a couple of years of successful daylight photography of deer by several methods, he took up the problem of night pictures. In those days jacklighting deer and other game was generally considered a legitimate form of sport, but Shiras and some other thoughtful sportsmen began to appreciate the deadly unfairness of this kind of hunting and abandoned a practice which is now generally outlawed.

Through jacklighting deer about Whitefish Lake, where he had established a permanent summer camp, Shiras had become fascinated by the romantic adventures of surprising wild things in their haunts by a sudden, revealing glare of light. When he abandoned jacklighting with a gun, he determined to devise some kind of flashlight apparatus that would enable him to make a photographic record of whatever he might encounter on canoe trips at night.

After several years of experiment, spiced by a variety of mishaps and some personal danger, he perfected a mechanism that could be held in one hand and fired, as readily as a pistol, by pulling a trigger.

The device worked very successfully with deer and moose, but it soon became evident that most wild animals, especially the smaller kinds, could not be approached at night and photographed from a canoe. It was obvious that a mechanism was needed that would automatically photograph animals at night wherever they might be found.

To meet these requirements, Shiras resumed his experiments and perfected the additional mechanism by means of which a flashlight would be fired and the shutter of a concealed camera would be operated at the moment of greatest illumination, whenever the end of the baited cord was pulled or a taut string stretched across a trail was tripped by a passing animal.

All of these basic inventions were covered by broad patents taken out in the United States and some other countries and then dedicated to the free use of the public to prevent their commercial exploitation.

So successful has been this form of photographic art that it has had an extraordinary popularity. It is in use in all parts of the world. The most intense interest attaches to these night-time photographs; for they reveal the activities of subjects that were formerly so well hidden by the darkness that they were almost a sealed book. Even the most devoted naturalist knew about them only such fragmentary facts as might be gleaned from tracks and other traces of their unseen passing.

WORLD-WIDE PRAISE GREET'S SHIRAS' UNIQUE PHOTOGRAPHS

Shiras' beautiful flashlight photographs were of such unique and startling interest that when the United States Government was preparing the material for its part in the World Exposition to be held in Paris, in 1900, the privilege of using a set of enlargements of them was officially requested.

The pictures attracted much attention and enthusiastic praise from visitors representing many countries. One French sportsman in a letter voiced the enthusiasm they aroused in people from all climes.

"They are superb," he wrote—"those photographs at our Exposition. I came across them the first day I was there and did not miss going to see them again at each successive visit. The stag that is coming out of the reeds, how beautiful and majestic he is! And the doe! And the little family! I was quite stricken with amazement at them. This is not mere photography—it is high art! How happy I would be to place these splendid pieces in my hunting castle. I am determined to tell you with how much admiration I have seen them, and count surely on seeing them again. I send you my felicitations."

The judges at the Paris Exposition in the Forestry Division expressed the general appreciation of this exhibit by the highest award, the Gold Medal and diploma. On learning of the display, and visiting it, the international jury in the Photographic Division asked permission and awarded their highest prize, a silver medal, to Mr. Shiras, who had not entered his work in their

exhibit. Four years later, in 1904, at the Louisiana Purchase Exposition in St. Louis, the Shiras photographs of wild life received the Grand Prize.

The slow response of mankind to new ideas is illustrated by the fact that despite the beauty of these wild-life, flashlight photographs, it was nearly fifteen years after Shiras had made public his methods and results before others began to emulate him in this attractive field.

Thus George Shiras, 3d, the original advocate of wild-life photography, was (1) the first to photograph in daytime wild animals or birds from a canoe or blind; (2) the first to get automatic daylight pictures of wild animals by their touching a string across a trail or pulling on bait attached to a string operating the shutter of a camera; (3) the first to operate the camera at a distance by a string running from a blind; (4) the first to invent a means for picturing animals from a canoe by hand flashlight; (5) the first to invent a means to obtain automatic flashlight photographs for which the animals or birds fired the flash; (6) the first to use two flashlights and two cameras, one set picturing the animal when quiescent and the other set, a second later, showing the animal in action when alarmed by the explosion of the first flashlight; and (7) the first to practice wing shooting with the camera by means of a specially devised apparatus by which wild fowl and shore birds can be photographed when flying from 50 to 75 miles an hour.

Mr. Shiras has made it a point not to photograph animals in parks or reservations, the only exception being in the case of the wilderness valley of the Upper Yellowstone, a portion of which lies in the southern end of the Yellowstone National Park. However, wild life therein is unaffected by the presence of man.

Camera hunting as a sport has advantages over gun hunting. It can be enjoyed at all seasons of the year regardless of closed months for the rod or gun. Thus it is available during those months of the year when animals may be seen to the best advantage.

AN EXAMPLE OF PATIENCE AND FORTITUDE

In developing and practicing wild-life photography, Shiras has shown an inexhaustible patience and a stoical indifference to personal discomfort rarely exhibited except by Indians or other primitive peoples. I observed an example of his fortitude one spring when we were obtaining photographs of birds on the marshes of eastern Virginia.

The clouds of voracious mosquitoes appeared to make little impression on Shiras. One day he made a small blind of bushes near the margin of a little muddy pool on the marsh and crouched for hours amid a blood-thirsty swarm of insects, awaiting the possible coming of shore birds.

Though mosquitoes were fattening on his bare neck, face, and hands, the only attention he gave them was an occasional slow and gentle brushing movement of one hand to wipe them from his face. His reward for this punishment was a set of beautiful flight pictures of willets, and portraits of a few other waders that visited the pool.

Although Shiras has always appreciated the permanent scientific value of his photographic and other studies as contributions to the life histories of

many species, he has been especially pleased by their effect on the public mind from the recreational point of view. He has felt that one of the most valuable results of placing such work in popular form before the public is to promote a greater interest in the out-of-doors.

He has insisted that to the vast number of people whose days are passed mainly under the increasing restrictions of massed humanity, the relief and benefit gained from a sympathetic contact with wild nature, especially in congenial companionship, lends to life a variety and interest of inestimable value, both physically and mentally.

Shiras has enlivened his pages with many amusing anecdotes without in any way sacrificing his accuracy in statements of fact. He has a sense of kindly humor often lacking in writers on natural history.

One specially attractive part of the field opened by Shiras is the sport of "wing-shooting with the camera." It lures both sportsman and naturalist.

PRICELESS NEGATIVES PRESENTED TO NATIONAL GEOGRAPHIC SOCIETY

Public approval of his work was greatly increased by the appearance of his first profusely illustrated article in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1906, entitled "Photographing Wild Game with Flashlight and Camera." Since then, from time to time, he has made contributions of similar nature to this magazine that have helped in developing the study and protection of wild life throughout the country as follows:

One Season's Game-Bag with the Camera, June, 1908.

A Flashlight Story of an Albino Porcupine and of a Cunning but Unfortunate Coon, June, 1911.

White Sheep, Giant Moose, and Smaller Game of the Kenai Peninsula, Alaska, May, 1912.

Wild Animals That Took Their Own Pictures by Day and by Night, July, 1913.

Nature's Transformation at Panama: Remarkable Changes in Faunal and Physical Conditions in the Gatun Lake Region, August, 1915.

The Wild Life of Lake Superior, Past and Present; The Habits of Deer, Moose, Wolves, Beavers, Muskrats, Trout, and Feathered Wood-folk Studied with Camera and Flashlight, August, 1921.

Wild Life of the Atlantic and Gulf Coasts: A Field Naturalist's Photographic Record of Nearly Half a Century of Fruitful Exploration, September, 1932.

The public favor accorded his articles in THE GEOGRAPHIC gave him an outstanding leadership in Nature Study and related activities.

As Shiras' collection of negatives resulting from his field work grew to large proportions, he gave much thought to the matter of its final disposition. He decided that the series of about 2,400 subjects should be preserved and made useful to others in the future. For this purpose he has presented them to the National Geographic Society, and they will be available to The Society's great educational work.

In accepting this invaluable contribution, Dr. Gilbert Grosvenor, President of The Society, on November 17, 1928, wrote, in part, as follows:

"We realize the tremendous historic and scientific value of your collection of negatives which you have made during a period of nearly forty years in all parts of North America. For future generations desiring to study natural life as it was in the original wilderness, your superb and unique collection of pictures will be indispensable. The first collection of pictures which you gave this Society enabled it to print that historic number, "Photographing Wild Game with Flashlight and Camera," in July, 1906, and started the organization on a path of usefulness in the promotion of public interest in the natural scenic and wild-life resources of the United States that brought The Society much credit and has also greatly assisted in conserving these treasures. This article, as well as other splendidly illustrated contributions which you have given, have aided greatly in increasing the membership of the National Geographic Society and arousing attention to, and creating favorable comments on, its ideals and achievements."

CARE NEEDED TO SAVE OUR "VANISHING AMERICANS"

At an earlier date Shiras had purchased and presented to The Society several hundred remarkably fine negatives made by the naturalist Henry W. Henshaw, who was Chief of the Biological Survey in the Hawaiian Islands at a time when it was still possible to get many views illustrating primitive conditions among the native people.

For more than twenty-five years Shiras has been on the governing board of the National Geographic Society.

Perhaps equaling his photographs in value are the records of the accurate observations that Shiras has made in many parts of this continent.

When he first went to northern Michigan, in 1870, conditions in the United States were very different from those prevailing today. Great tracts of forest remained untouched by the lumberman's ax. Means of travel were crude and undeveloped; motor boats, automobiles, and airplanes, with all the intensive modern development and exploitation of our natural resources, were still in the future. For this reason his earlier observations record a primitive and then a transition period which have given them the increased value of great historic importance.

His breadth of interest and his illuminating comments on what he has seen constitute such a charming whole that they frequently remind one of the classic records made by Gilbert White of Selbourne. Much of his ability to present so interestingly and logically his observations is due to his long training in the legal profession, combined with his gifts as a naturalist.

With the growth of population ever reducing the areas available for wild things, and a yearly increasing army of licensed hunters, already numbering about seven million, it is plain that a general desire for the conservation of our wild-life resources is all that can save it for the future.

The great auk, passenger pigeon, and Carolina parakeet, as well as other birds, have gone forever, while the bison, prong-horned antelope, wapiti, and

grizzly bear in the United States have been reduced from their former vast numbers to the danger point. These signs point to the urgent need of making field and photographic studies of our wild life before it becomes too late.

The astute white-tailed deer in the United States is pursued each year probably by a larger number of hunters than is any other single game animal in the world. In his account of it Shiras makes evident the marvelous intelligence and adaptability that enable it to maintain itself, when given fair protection. This has been demonstrated to such an extent that more than 125,000 surplus whitetails were killed in 1931 within 300 miles of New York City, the most densely peopled region of the United States.

Shiras' field observations so strongly impressed him with the urgent need of careful guardianship of our native bird and animal life that he became a leader in the long campaign to save our wild-life resources and in movements to perpetuate wilderness areas by the establishment of national parks and other refuges.

Throughout his earlier life in western Pennsylvania Shiras was active in civic and political affairs of that section. Serving in the Pennsylvania Legislature in 1889 and 1890, he attracted state-wide attention, although a new member and one of the youngest in the House.

A CHAMPION OF THE NATION'S WILD LIFE ENTERS CONGRESS

In the spring of 1902 a reform movement was started in Allegheny County to eliminate a political ring that had been dominant for more than twenty-five years. To this end an opposition ticket was nominated including congressmen, legislators, and the important county officers. At that time Shiras had announced his retirement from the practice of law that he might take up in a more systematic way the study of wild life and the problems connected therewith.

He was offered the nomination for Congress in the then 29th district with the understanding that if elected he need not be a candidate for reelection. Believing that it was his duty to assist in this movement, and also feeling that if elected he might be able to inaugurate, or assist in passing legislation providing for the better protection of wild game throughout the country, he actively entered into the contest. At the fall election the entire ticket was elected, and the control of the ring irretrievably broken.

The 58th Congress (1903-05) was conspicuous for several reasons. "Uncle Joe" Cannon of Illinois, long a political leader, was elected for the first time Speaker of the House. At the head of the National Administration was the indomitable figure, Theodore Roosevelt, who had recently succeeded to the Presidency upon the tragic death of William McKinley.

At that time, as at present, there was no standing committee on game protection in the House; therefore Shiras applied for and received appointment on the Public Lands Committee, part of whose jurisdiction included the creation of national parks and monuments in which he was particularly interested.

He wrote the report of the committee recommending the passage of the Humphrey bill creating the Olympic National Monument in the Olympic

Forest Reserve, Washington, and another report favoring setting aside the unique petrified forest of Arizona. Both of these areas were afterward made national monuments.

During his second year on the Public Lands Committee there arose a persistent demand in the East for the extension of Yellowstone Park southward into Wyoming in order to protect the larger game animals in the Upper Yellowstone Valley, where the animals from the Park were the target of many hunters. As the only eastern member on this Committee, Shiras undertook to bring about this proposed extension.

In the summer of 1904 he visited Yellowstone Park, principally for the purpose of familiarizing himself with the situation. Becoming satisfied that the plan was a proper and feasible one, he started to prepare a bill which, when introduced, would naturally be referred to his committee.

Frank W. Mondell of Wyoming, a member of the committee, strongly objected to the Park extension because the greater part of this Park had formerly been a portion of the Territory of Wyoming, and any further encroachment on its lands would be objectionable to his constituents. He suggested that this legislation be withheld, and as a compromise said he would have the Wyoming legislature create a permanent game refuge on the lands adjoining the Park. This proposition was accepted by Shiras and was promptly put into effect by the Wyoming legislature. Thus were brought about the main objectives to be covered in the proposed bill.

In this connection it is interesting to note that at the time of his first visit to the Yellowstone region Shiras heard rumors that several moose had been seen on Thoroughbred Creek on the southern boundary of the Park. This animal was not supposed to exist at that time in the Rockies south of Canada.

UP THE YELLOWSTONE TO THE HOME OF THE MOOSE

To investigate the rumor, Shiras ascended the Upper Yellowstone by canoe in three successive seasons. He found a large number of moose sequestered in the broad river valley where forests, marshlands, streams, and little lakes provided an excellent all-the-year home. On his final visit Shiras estimated the moose in this little-known section to number probably more than 2,000, which was a surprise to the Park authorities, as well as to the outside world.

Thus the newly established State game refuge in northern Wyoming was just in time to give protection and enlarged quarters to the increasing moose. Later the writer of this Foreword discovered this to be a new geographic subspecies which he named *Alces americana shirasi*.

As his term of service in Congress approached an end, Shiras prepared and introduced in the House the now famous Migratory Bird Bill. It was introduced with no expectation or desire that this novel measure should be given consideration in the concluding days of that Congress. The primary purpose of its author was to lay before sportsmen and the country generally a proposition requiring long and careful consideration.

This measure quickly received nation-wide support. Among its early advocates was the Chief Executive, who wrote the following terse approval:

THE WHITE HOUSE,
WASHINGTON

February 1, 1905.

MY DEAR MR. SHIRAS:

I am very much pleased with your bill and am very glad we have in Congress a man taking so great an interest in the preservation of our birds and Nature generally. I particularly wanted wild fowl to be protected.

With hearty congratulations,

Sincerely yours,

THEODORE ROOSEVELT.

Hon. George Shiras, 3d,
House of Representatives,
Washington, D. C.

In several succeeding terms Congressman Weeks of Massachusetts reintroduced the bill. Extended hearings were held on it, and on March 4, 1913, it was enacted.

In referring to the benefits derived from this law Shiras wrote, in part, as follows: "Spring shooting was prohibited at a time when tens of thousands of mated wildfowl were slaughtered each season while on their way to their breeding grounds. At the same time a stop was put to the devastating activities of hordes of market hunters who were solely interested in turning ducks into dollars. The shooting seasons were also materially shortened and the bag limits reduced to meet the needs of the time.

"Thus was born and put on the statute books a conservative measure that came just in time to save from possible extinction our rapidly decreasing wildfowl. Here successful result was due primarily to the united support of the sportsmen, the out-of-door magazines and the many civic organizations concerned in the preservation of our natural resources."

FEDERAL AID FOR FAR-FLYING FOWL

In connection with his presentation of this first bill Shiras set forth the reasons why he considered it necessary for the Federal Government to extend its protection to these resources. A lifetime of experience with migratory birds, especially the species classed as game, had convinced him that they were rapidly declining in numbers because of the inadequate protection that was inevitable under the varying laws of the different States.

The States, as he explained, lacked extraterritorial jurisdiction and would not agree nor bring about by themselves uniform laws and enforcement. It had become clear to him that a situation had arisen that could be handled

only by the Federal Government; for no State could justly claim definite ownership in birds that might be in one State today and pass successively into several other States within the next day or two. They might pass the winter thousands of miles away, possibly in another country, from the place in which they reared their young.

When the Act came before the Federal courts, only one out of eight judges decided against its constitutionality. To meet future contingencies and to broaden its purposes, the essential provisions of the Act were incorporated in a Migratory Bird Treaty with Great Britain, signed August 16, 1916. The constitutionality of this treaty was later sustained by the United States Supreme Court on a brief by Shiras, thus confirming the right of our National Government to exercise its effective jurisdiction over migratory birds, and at the same time providing Canada with a similar jurisdiction over its vast domain.

During his term in Congress Shiras strongly advocated Federal control both of contagious diseases and epidemic conditions, also control of the pollution of interstate waters, as well as more extended medical research throughout the country to safeguard the public health in many ways in which the separate States lack power.

SHIRAS SOUGHT TO SAFEGUARD HEALTH

To this end he prepared and introduced a bill to create a National Department of Public Health with cabinet representation, in the expectation that by reason of the needed additional functions a broader jurisdiction would be established than then existed in the scattered health agencies of the general government. This would give it the same effective authority to protect man as has been given to the Department of Agriculture to foster and protect the useful and control the harmful plant and animal life of the nation. He also urged the negotiation of international treaties for the protection of whales and other pelagic mammals threatened with extinction.

After his retirement from Congress Shiras wrote to educate the public in the foregoing ideas, a series of papers on the regulatory powers of the Federal Government. The series included (1) The Character and Extent of National Police Power, (2) The Constitutionality of the Migratory Bird Law, (3) The Health Jurisdiction of the Federal Government, (4) An American League of Nations, (5) History of the Original Migratory Bird Bill, and (6) The Protective Tariff, as well as similar papers dealing primarily with the regulatory jurisdiction of the Government and its relations to foreign nations in regard to such matters.

For many years Shiras has been active as member or director in numerous conservation organizations where his counsel has had great weight in helping determine broad policies relating to national parks, national forests, and national bird and game refuges. His most recent contribution to the cause of conservation was the so-called Shiras Gun Law in Michigan, which the State Legislature passed in 1925. It prohibits the carrying of a gun in any hunting area in the State in the closed season.

It was estimated that previously at least half the deer killed in the State, and these mostly does and fawns, were shot in the closed season. This law made the convicting of violators so simple that it had a prompt and satisfactory effect. It is the first law of the kind and should be enacted in other States; for under the usual statutes, convicting those who kill game out of season is difficult.

Aside from the Federal protection of migratory birds, Shiras believed that his most effective practical work in conservation was his early and persistent support of the "buck law," protecting does and fawns. Upon the general enactment of this law he felt the permanent supply of our antlered animals largely depends. He pointed out that "if a farmer had as many roosters as hens, or as many bulls as cows, and killed the same regardless of sex he would be regarded as one so lacking in common sense as to raise suspicion of his sanity."

HE BECAME WEATHER-WISE THROUGH YEARS OF OBSERVATION IN THE WILDERNESS

As a wanderer in wild places, Shiras was so often subjected to changing weather conditions that his powers of observation and deduction were often turned toward the weather and its problems. In the course of time he became weather-wise, especially in northern Michigan, where his opportunities for making observations were excellent. There and in some other places he became very successful in foretelling approaching weather changes.

His versatility of interests was well illustrated also by the beautiful and extensive series of photographs of forest fungi that he took near his Whitefish Lake Camp. By these photographs, all taken near camp, he demonstrated in a limited area the abundance and interesting character of these curious and often beautiful plants and the value of the camera in making scientific records of them in their chosen locations.

Among Shiras' marked characteristics, and one that may be noted as rather uncommon, is the sympathetic and generous friendliness with which he has always viewed the work of others in the field he made peculiarly his own. He has invariably voiced appreciation and hearty commendation of good work, and makes a generous and helpful response to requests by beginners for advice and suggestions. Many applicants, even men unknown to him, have been granted the free use of his photographs to illustrate their writings.

When modern developments rendered easily accessible the big-game fields of Eastern and Central Africa, Shiras was often tempted to become personally acquainted with the wealth of animal life assembled there on a scale found nowhere else on the earth within historic time. Second thought, however, always convinced him that the right field for his work lay in North America, where, so far as time and ability would permit, it was his duty and pleasure to acquaint the people of the United States with the wild life of their country, and of the continent as a whole, and interest them in it to such an extent that they would desire to maintain and upbuild it.

Among the honors that have come to Shiras in recognition of his work as a student and conservator of wild life is the degree of Doctor of Science conferred in June, 1918, by Trinity College, Hartford, Connecticut. It is of interest to note that at the same time, and for the same reason, the same degree was granted to Theodore Roosevelt.

As a mark of high appreciation of the value to conservation of the concept of the migratory bird law and of other constructive ideas contributed to the cause, a prominent group of Shiras' fellow workers in this field, on April 30, 1921, presented him with a handsome and appropriately engraved silver service. The letter of presentation reads as follows:

DEAR MR. SHIRAS:

You and I do not hold with the cynic's view that

"The evil that men do lives after them,
The good is oft interred with their bones."

We believe instead that somehow, sometime, the average man receives about all the credit due him for whatever he has done.

Nevertheless men's memories are short. Because today there is a Federal Migratory Bird Law which has greatly increased the numbers of our migratory birds, some people seem to take it for granted that this law was a normal outgrowth of the general effort for game protection, and accept it rather as a matter of course.

Those who have been long familiar with the progress of the work done to protect wild life, recognize, however, that it was your genius which discovered the legal distinction between animals that are migratory and those that are sedentary, or local. Through this discovery we owe to you the greatest single accomplishment ever made in wild-life protection. No man has rendered a service in this respect so great as yours.

We wish to give some slight material expression to the gratitude we feel for that service, and so we are sending you a personal reminder of the great work that you have done, which reminder is also an evidence that we forget neither the work nor him who performed it.

Yours sincerely,

GEORGE BIRD GRINNELL,

New York City, N. Y.
April 30th, 1921.

*American Game Protective Association,
Boone and Crockett Club,
Camp Fire Club of America,
National Association of Audubon Societies.*

From about the time the first article by Shiras appeared in the NATIONAL GEOGRAPHIC MAGAZINE, Theodore Roosevelt, then President of the United States, became especially interested in his work as a field naturalist and repeatedly insisted in conversations and in letters that the remarkable store of information possessed by such an experienced naturalist must be published. This insistent demand continued on the part of Colonel Roosevelt

until the time of his death. The following letter from him, among others on this subject, is to the point here:

Oyster Bay, N. Y.
July 14, 1906.

MY DEAR SHIRAS:

I have been looking through your photographs in the NATIONAL GEOGRAPHIC MAGAZINE. Now, my dear sir, no other work you can do (not even going to Congress; still less, writing articles for pamphlets or magazines utterly evanescent in character) is as important as for you to write a big book—a book of bulk as well as worth, in which you shall embody these pictures and the results of all your invaluable notes upon the habits, not only of game but of the numerous other wild creatures that you have observed. I feel strongly that this country stands much more in need of the work of a great outdoor faunal naturalist than of the work of any number of closet specialists and microscopic tissue-cutters. Do go ahead and do this work!

Sincerely yours,

THEODORE ROOSEVELT

Hon. George Shiras, 3rd,
Pittsburgh, Pa.

Colonel Roosevelt was especially interested in having put on record the extended studies of the white-tailed deer made by Shiras, and in a letter dated July 7, 1915, wrote: "I am delighted to learn that you are going to take up seriously the white-tailed deer biography. That's a great thing to do."

As a consequence of this insistence, coupled with that of numerous others who knew the value of the material he had accumulated, Shiras finally assured Colonel Roosevelt that he would prepare for publication in book form the results of his work as a field naturalist. With the death of Colonel Roosevelt the feeling of obligation to do this became imperative, and he has finally been able to complete the task.

He has put into permanent form a combined wealth of original photographs of, and detailed observations on, our wild life and its environment unequaled by those of any other American naturalist. These labors and the constructive ideas he has contributed to the cause of conservation are the outstanding products of a useful life.

Introduction

THE reception accorded my field observations and photographs of wild life that have appeared from time to time in the NATIONAL GEOGRAPHIC MAGAZINE has encouraged me to revise these articles and republish them, with much new matter and many previously unpublished photographs.

An adequate knowledge of the natural history of any country must be the result of the work of many observers. In these volumes I am glad to make my contribution toward a better acquaintanceship with our fellows of the wild. To observe and photograph wild things by day and by night has been a joy and an inspiration. I shall feel well repaid if these records of many years convey some of this feeling to others and induce them to learn for themselves the pleasure of getting close to Nature.

These writings should not be considered in the light of a technical work on natural history, that field having been covered by numerous American zoologists in recent years. Such works are often compilations, since no writer can be expected to have a first-hand knowledge of all members of our diverse fauna.

The present undertaking is more in the nature of the autobiography of an out-of-doors man, seeking to present, by pen and camera, a series of narratives covering his long personal experiences in the careful study of animal and plant life or, at times, relating to more casual observations that seem worthy of record.

In either case the author has always tried to be scientifically accurate, sometimes presenting viewpoints that are either new or inadequately presented by other observers, thus making contributions to the life histories of some of our wild neighbors. The subject will require the devoted work of many observers for years to come.

WILD-LIFE PICTURES INSTEAD OF ANTLERS OR RUGS

As a pioneer in wild-life photography, I regard with intense satisfaction the place the camera now occupies in the equipment of the sportsman as well as in that of the field naturalist. The latter recognized its value almost as soon as dry plates were available. But the former was not convinced of its superiority to the rifle until improved apparatus enabled him to obtain photographs of big game which were not only more beautiful than mounted heads or rugs, but were far more impressive evidences of his prowess as a hunter.

In 1875 I began keeping diaries of my movements and of interesting occurrences. The entries during the earlier years were mainly records of the personal experiences of a youthful fisherman and hunter. In this period, however, was gathered a great fund of information concerning the wild things of the Lake Superior region that became very useful when the camera gradually replaced the gun.

With very few exceptions the many pictures of wild life used in these volumes have been taken by me. I have made due acknowledgments where others' pictures have been used.

The restriction of illustrations mainly to my own endeavors arises from two rather distinct causes. When I finally became interested in hunting large game animals with the camera, I was inspired by precisely the same reasons as the sportsman who cherishes trophies he obtains by successfully stalking wild animals amid pleasing surroundings. The addition of similar or superior trophies obtained from other sources would detract from the intimate enjoyment of the collection.

Later on, when I made preparations for publishing accounts of my many camera hunts, illustrated by pictures of many kinds of wild creatures, the underlying motive of my natural desire to use my own photographs was the direct encouragement the efforts of a single individual would give to others in substituting the camera for the gun.

On retiring from the active practice of my profession in 1905 to devote my time to the conservation of wild life and to other governmental problems, I was able to make many expeditions to the more remote parts of the country. Even then my absence from the family circle rarely exceeded a month or six weeks, for my plans were always made well in advance with a view to visiting suitable localities without unnecessary loss of time.

Hence I have written largely as a sportsman-naturalist, under the same limitations as to time that ordinarily limit the periods of the big-game hunter on his annual visits to the wilds. In addition I have given consideration to weather conditions and to subjects connected with the plant kingdom; for each is often indissolubly linked with Nature's sway over the animal life on our planet.

CAMERA HUNTING REDUCES STRAIN ON GAME SUPPLY

In my earlier days an ardent hunter, I should be an ingrate if I lost interest in the welfare of my former comrades in arms. The millions of devotees of the rod and gun represent, as a whole, one of the largest and best elements in our citizenry. Their incursions on land and water bring health and enjoyment to those largely confined within the city limits and in need of such a vigorous form of recreation.

I am not in sympathy with the well-meaning but misguided humanitarians who demand continuous protection for all wild things, since in a few decades the uncontrolled surplus of big game would bring their increasing numbers to the verge of starvation through destruction of their food supply. Of this danger I have given instances in subsequent pages. Ordinarily in national parks and game refuges complete protection is necessary.

Of course, with the growing number of sportsmen, and a marked decline in the supply of food and shelter by an ever-encroaching civilization, it has become urgently necessary to enact and enforce stringent laws, in order to maintain a proper ratio between the hunter and the hunted. If many

sportsmen can be induced to take up the camera, it will help reduce the strain on the game supply.

When visiting many parts of this continent, I have always tried to bring back both written and photographic records in order that others may see and enjoy, even in an imperfect way, the varied life and its scenic backgrounds that give individuality to each great region. No printed page, however, can do more than stimulate one's interest in the sheer joy of life and its marvels in the wilder places.

Brief as was my term in Congress (I voluntarily retired from that body), it had marked influence on the latter half of my life. On returning each season from Lake Superior or other parts of the country, I passed in Washington a portion of each winter for thirty years. Here, in scientific circles, I found many congenial friends and continued my connection with several national organizations concerned in conserving natural resources.

Naturally, I was also interested in the coming and going of seven Administrations, from a Roosevelt to a Roosevelt, and in the policies of each, relating to the subjects that appealed to me most.

I have had an excellent opportunity for studying and photographing many birds of the District of Columbia. The study has been facilitated since my occupation in 1926 of a forest ringed cottage in Wesley Heights.

FUTURE OF NATURAL RESOURCES "REASONABLY BRIGHT"

With the recently installed Administration showing a broad and sympathetic interest in the preservation of our natural resources and with Congress disposed to support this policy, the future seems reasonably bright for a rational control over the ever-increasing demands on Nature's bounties.

I have a deep feeling of gratitude to Theodore Roosevelt for his enthusiastic approval of the field work I was doing and his urgent insistence, both while he was in the White House and during the remainder of his life, that my observations be published in full. He repeatedly stated that our literature was deplorably lacking in books on hunting, fishing, and exploration compared with what it might have contained had it been enriched by Americans whose experiences warranted such permanent record.

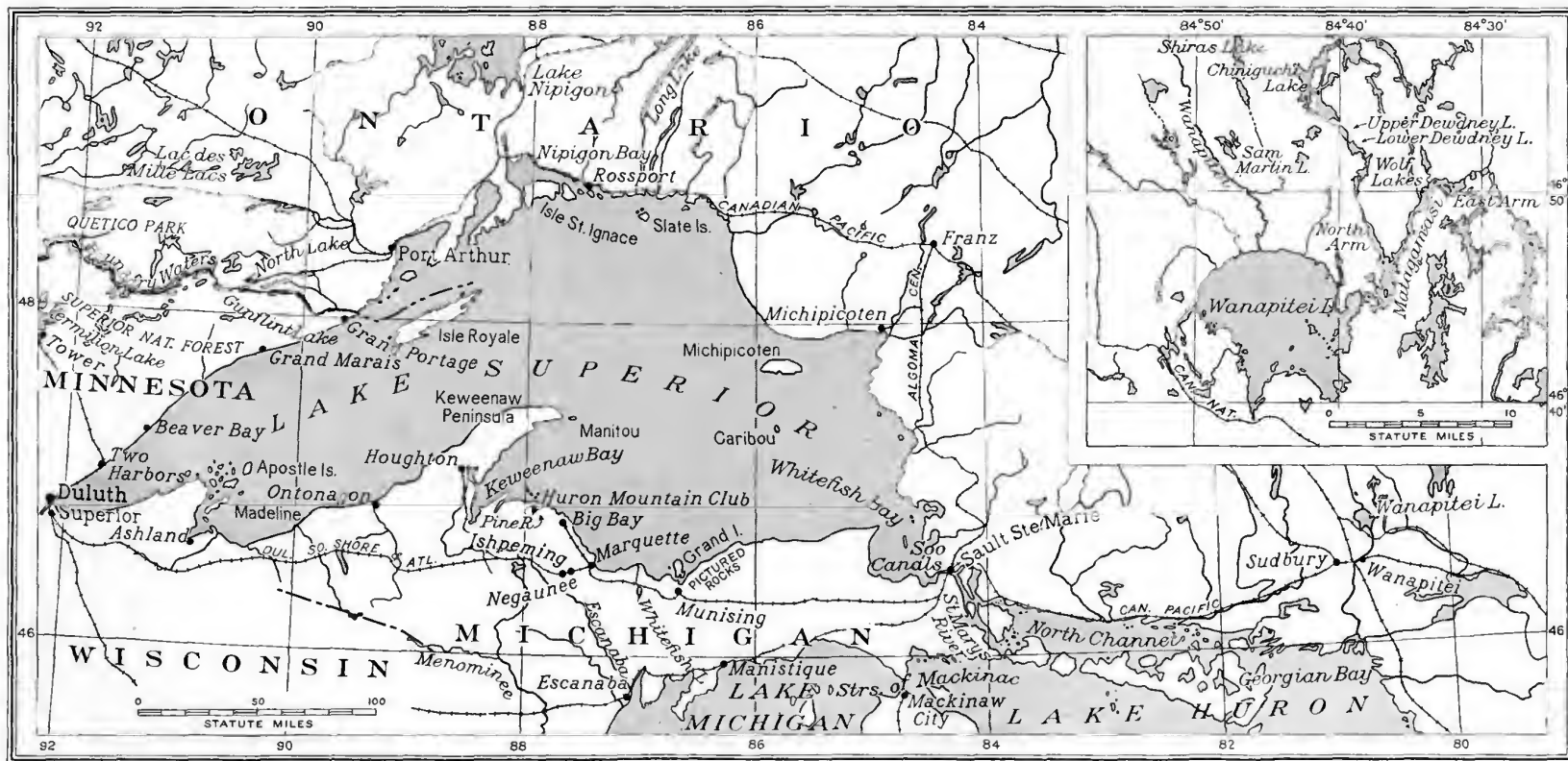
To Dr. Gilbert Grosvenor, Editor of the NATIONAL GEOGRAPHIC MAGAZINE, I am under lasting obligations for the active encouragement and help he has given me from 1905 when he requested my first contribution to the Magazine.

It gives me special pleasure to express my appreciation of the assistance rendered by my wife in preparing parts of the original manuscript, and of her companionship in enjoyment of the bird life attracted about our homes.

I desire also to record indebtedness to my guide, John Hammer, for his many years of faithful services in the field, which have contributed so much to my photographic success.

Finally, I am under deep obligation to my intimate friend and associate, Dr. E. W. Nelson, for his interest and assistance in the arduous task of revising and preparing the manuscript for these volumes.

GEORGE SHIRAS, 3D.



THE LAKE SUPERIOR REGION IN WHICH, FOR 65 YEARS, THE AUTHOR HAS STUDIED AND PHOTOGRAPHED WILD LIFE

His summer home is at Marquette, Michigan, a place admirably situated for his purposes. It was near this city that, as a boy of 12, he had his first wilderness experience. He has hunted, first with the gun and later with the camera, over virtually every portion of the territory included in this map, and has seen with keenly observant eyes the changes brought about by advancing civilization. In the inset is a lake named for him. He had the honor of bringing to the attention of sportsmen several such bodies of water, as well as some streams.

TO THE MEMORY OF

THEODORE ROOSEVELT

SPORTSMAN, NATURALIST, EXPLORER, STATESMAN,
AND CONSERVATOR OF WILD LIFE

these volumes are respectfully dedicated
by the author



"NATURE FAKERS BEWARE"

At the June Commencement, 1918, Trinity College, Hartford, conferred, among honorary degrees, that of Doctor of Science on Theodore Roosevelt, R. D. Cole, and George Shiras, 3d, for distinguished work as field naturalists. This group, including President Luther, was photographed at the request of Colonel Roosevelt, who exclaimed when the photograph was taken, "Nature fakers beware." Six months later this eminent conservationist died.

CHAPTER I

The Lake Superior Region and the First of Sixty-five Annual Visits to It

THE field of my experiences and observations in the Lake Superior region as given in this volume covers a great area characterized by a general similarity in climatic and other physical features, and in fauna and flora.

Lake Superior, as Nature's largest reservoir of pure, deep fresh water in the world, has been appropriately named. It lies in the form of a wide crescent with its convex side toward the north. Along the curve of its axis it measures 420 miles; its greatest breadth is 167 miles. Its surface is 602 feet above sea level, and the maximum depth is 1,290 feet. Thus the bottom of its basin is 688 feet below sea level.

The lake is fed by many tributary streams, none of them of considerable size or length. The surrounding shores, especially on the south, have a greater precipitation of snow, with a single exception, than any other area of similar altitude east of the Rocky Mountains.

PRIMITIVE ROCKS AND VIRGIN WATERS

Overflowing the rock-rimmed eastern end in a series of tumultuous rapids, the excess waters of the lake have channeled out the beautiful Sault Sainte Marie River, with its wooded islands and many bays. They pass beyond this through straits, lakes, rivers, and a great estuary to the sea, two thousand miles away.

The geological formations of Lake Superior are grouped into three major divisions: the Archean, the Algonquin, and the Cambrian—separated by unconformities of great magnitude. The basic divisions may be treated as rocks of crystalline and sedimentary origin.

This region is of much interest to the geologist, for it contains some of the finest iron and copper deposits in the world, as well as slate and sandstone. Included in the latter is the "Lake Superior sandstone," its early formation indicated by its containing little or no fossil remains.

The surfaces of the primary rocks are heavily scored by glacial action, while the overlying strata of sandstone, often many thousand feet thick, have been fashioned by

the elements into fantastic and impressive shapes, resembling battlements and turreted castles separated by high, perpendicular cliffs of variegated colors. These cliffs contain water-worn caverns which small boats may enter.

One group of rocks on the southern shore is known as the "Pictured Rocks," once considered the most famous of our natural phenomena, but now overshadowed by the magnitude and diversity of the scenic features in the Rocky Mountain region.

Unlike the south shore of the lake, with its sloping hills, broad bays and long sand beaches separated by rocky headlands, the north shore resembles somewhat the southern shores of Alaska, for it is elevated and rockbound, and many clear, turbulent trout streams cut through the dark coniferous forests and plunge down the steep watershed into the crystalline waters.

Here also is an archipelago of wooded islands, some surmounted by rocky domes a thousand feet or more high, the larger ones harboring moose, deer, caribou, and bears. Between these islands and the main shore are deep, tortuous channels and safe harbors, the whole affording ideal cruising grounds for the sportsman and tourist.

GREAT WINDS CALM THEIR FURY

It may interest and astound many to learn that gales of hurricane velocity are unknown over Lake Superior, and that even moderate gales are extremely rare. Heavy winds blowing offshore strike on the lake a cool blanket of air which deflects them upward and causes them to decrease in velocity. The highest winds of this kind recorded in 50 years at Houghton, Marquette, and Sault Sainte Marie, along the south shore, have been from 60 to 62 miles an hour—an almost unparalleled record on this continent.

After interviewing many experienced captains of boats navigating the lake, and making careful study of weather records made along its shores, I have reached the belief that no winds on the middle of Lake Superior ever exceed 45 miles an hour. The broad surface of the lake affords op-



IN EARLY DAYS THE OJIBWAYS BUILT SIGNAL FIRES ON THESE GRAY DOMES

The polished stony knobs and level summits of these short, narrow ridges in the famous Marquette Iron Range form unique islands in the surrounding forests.

portunity for a moderate wind to produce wave action so much greater than would appear under similar conditions on smaller bodies of water that it creates the impression of much more severe storms than the records confirm. Along the south shore, at least, during the greater part of the summer months, calm weather or exceedingly light winds prevail.

The temperatures of the deeper waters in the main body of the lake are from 38° to 40° Fahrenheit throughout the year. In summer the temperature of the surface waters of sheltered bays rises 10 or 15 degrees above this. The presence of this vast body of cool water has a direct effect on both summer and winter temperatures in a belt a dozen miles broad along its southern shore.

The mean summer temperature at Marquette is about 63°. This seems to be the lowest summer average for a locality in this country at the same altitude and latitude. The influence of the lake is shown also by a distinctly higher winter temperature.

Circling the lake, the forests are much the same everywhere, except that the rotund spruce of Ontario is replaced mainly on the

Michigan shore by towering hemlocks, the roots of which give the streams a deep wine color.

PRIMEVAL FORESTS AND SUCCESSORS

When travel by water was the principal means of seeing the lake country, it was assumed that upper Michigan was a vast pinery; for its shores and the interior streams were fringed with green throughout the year, and conspicuous in the months of open water were the buoyant pine logs floating on the streams to be rafted down the lake for the eastern market. When the railways and the logging roads reached the higher ground, extraordinary forests of sugar or hardwood maple in solid stands were discovered, with an abundance of beech, yellow birch, basswood, ash, and elm, and scattered groups of oak.

The result was the development of many woodworking establishments and huge charcoal furnaces. The abundance of sugar maples at present warrants a syrup production exceeding that of Vermont and New Hampshire.

Nowhere, probably, on the continent is the fall foliage more beautiful in brilliancy



SUMMER SMILES ON GRAND PORTAL, IN THE PICTURED ROCKS

This was one of the most impressive features of the Pictured Rocks in the many years of the author's visits to this region. Unfortunately, a few years ago the arches collapsed.

of contrasting colors. Much of this gorgeous display is of recent origin, for with the removal of the older forests the increase of clearings, and the unending stretches of the interior driveways, came a second growth of low-branched, symmetrical trees, one of which, the soft maple, is spreading rapidly. When it is cut to the ground, there springs from the stump a spray of green saplings that in autumn turn to a fountain of pink and red, many of the leaves splotted like a painter's palette.

Equally abundant is the poplar, its leaves fluttering in the slightest breeze and becoming brilliant yellow in the fall. The bronzed beeches and oaks and the lavender of the wild cherry are interspersed with the mountain ash, bending beneath its clusters of red berries, the more vivid hues alternating with the contrasting greens of the balsam and cedar. Back of this brilliant assemblage often stretch great forests of hardwood maple in a monotone of orange, the edgings carpeted with the crimson masses of the huckleberry, while daisies, goldenrod, and giant ferns join in the culminating color effects of the ebbing year.

The interior lakes and ponds present the climax of this hectic season; for nature, flushed with intermittent frosts, duplicates its colors on the mirrored surfaces, all domed with the azure of the northern sky.

THE NORTHERN MICHIGAN WILDERNESS

During my early experiences in northern Michigan, a large part of this region was untrodden by man. The forested area lying between Lake Superior and Lake Michigan had so few trails or highways that it was known to comparatively few, and the parts known lay mainly near the lake shores.

Geographically and economically, northern Michigan, known as the Upper Peninsula, should have been made a part of Wisconsin; for it is entirely cut off from the rest of the State by Lake Michigan. Its forests, mines, climate, and scenery give it a natural relationship to its neighbor.

The Upper Peninsula, with little prospect of any great development in agriculture or manufactures, seems destined to a long future as a recreational wilderness area.

The Lake Superior region was thoroughly explored by the Jesuit missionaries and was

a busy field for them and for traders long before other parts of the western country had been visited by the white man; for the hardy voyageurs used the great water-course from the sea when settlements on the Atlantic coast were few and far apart.

THE OJIBWAY INDIAN

In 1658, Radisson, the fur trader, gave the first written description of the south shore, and he was followed in 1660 by Father Menard, in 1665 by Allouez, and in 1669 by Marquette. Some evidence exists for believing that this region was visited by white men long before these dates, it having been asserted by Chase S. Osborn, former Governor of Michigan, that as far back as 1542 Roberval's men penetrated thus far.

Among the first of the resident Indians on Lake Superior were the Ojibways, commonly called Chippewas. Belonging to the Algonquins, they were driven west along the Great Lakes, it is supposed, by the more warlike Iroquois, and on reaching these terminal waters found in possession the Sioux, a tribe resembling the Iroquois in habits and disposition.

Bitter warfare ensued; but the Ojibways, having a continuous supply of guns and ammunition from the East, drove their rivals out upon the prairie country, where they became pony Indians, changing their habits materially. The division between the contending forces was in Minnesota, the wandering trapper being able to recognize the different tribes by the tall, conical lodges of the Sioux (see page 192), and the low-domed habitations of the Ojibways (see page 11).

Hunting, fishing, and trapping, combined with the use of the birch-bark canoe, developed a habit among these Indians of occupying more or less permanent locations within sight of the water. Thus their mode of living came to differ sharply from the nomadic life of most of those farther west.

In the early days there were neither moose nor deer in this region, and few caribou. This forced the aborigines to live largely on fish, which were easily obtained from the Sault Sainte Marie River, where the rapids remained open during the winter. Here was established their largest village, and they were brought into contact with travelers, whom they served as guides and packers. They were recognized as the most responsive and dependable members of their race, for early intercourse with the mission-

aries had prepared them to welcome the white man as a friend.

At present the Ojibways have virtually disappeared from the south shore of Lake Superior, but still make their homes in considerable numbers throughout western Ontario and northeastern Minnesota, where the abundance of fish and game, supplemented by an annual pension from the United States and Canadian governments, favors their existence. Under conditions similar to those of a hundred years ago, sportsmen visiting the region may obtain an insight into the life of the tribe that inspired the story of Hiawatha.

FIRST VISITS TO LAKE SUPERIOR

In 1869, when I was ten years old, I was presented with my first shotgun, a small-bore, muzzle loader, with which, under parental instruction, I was able to bag a few squirrels, quail, and rabbits in the wooded country on and near the banks of the Ohio below Pittsburgh. This gift was in view of a trip to Lake Superior planned for the following year, where I was to be permitted to travel on ancestral trails to a region of hearsay, and to see with my own eyes this wonderful body of water and tributary streams, the great forests of pine and hardwood, the picturesque Ojibway Indians in their birch-bark canoes, and, more than all, the trout, grouse, wild pigeons, deer, bears, wolves, and many other fur bearers that still tenanted the streams and retreats of a wilderness.

Fated to continue in this inherited privilege, I have passed more than 60 years in a study of the wild life of a great homogeneous area, where the extinction or marked decrease in certain forms has been compensated for in part by the gradual appearance of species new to the region, and by the increase of some of the more valuable birds, animals, and fishes so improvidently destroyed in pioneer days.

After my arrival at Marquette I was eager to see the surrounding wilderness, and a chance to satisfy my yearning came to my younger brother and me when a family party made a camping trip to the mouth of the Huron River, 50 miles to the west. This area was at the time a remote part of the southern shore. Not a habitation existed between the town and the camping place.

Transported by steamer to within five miles of the shore, we were soon under way in several yawls, with canoes in tow.



FROZEN SPRAY LENDS SPLENDOR TO MINER'S CASTLE

The water from waves dashing against this striking design of nature has given it a base resembling marble, the brilliant white of which contrasts strikingly with the evergreen forest.

Passing the rocky Huron Islands, dotted white with nesting herring gulls (the area included what became one of the first of the northern bird refuges established by President Roosevelt 35 years later), we landed and pitched our tents in a small clearing near the mouth of the river. Followed 10 most interesting days beneath the canvas.

INDIAN GUIDES COMMAND INTEREST

The Indian guides were, perhaps, the objects of greatest interest; for they gave much attention to the two young members of the party, whose incessant questions were interrupted only by raids on the provision tent. Trout, grouse, and pigeons were abundant, and many deer tracks along the banks indicated what might be done in the hunting season.

Among the guides was one first employed by my grandfather in 1850. Of swarthy complexion and comical expression, he was said to resemble the Jack of Spades (see page 420) and consequently was called Jack La Pete, a corruption of the French term for that card figure. Jack was small, thin, and active, with a volubility in striking contrast to the usual taciturnity of his race, a trait possibly due to a trace of Hibernian blood. In other respects he resembled the Ojibway Indians.

During long contact with the better class of pioneers, who were intent upon the permanent development of a country rich in minerals and timber (he often acted as guide to those seeking to enjoy the abundance of game and fish), Jack had gained a greater knowledge of worldly affairs than any of his associates, and the fact that he had passed a year in Washington as interpreter in litigation affecting his tribe added further to his prestige.

Beside the camp fire in the evening he made us little birch-bark canoes initialed with the quills of the porcupine. His skillful hands made the spreading tail of the grouse become a fan, and the skin of the muskrat a shot pouch. In conversation he was equally fascinating and told many weird tales, including one concerning a personal interview with the great Manitou, who, he said, had come down his clay chimney and with a mysterious incantation restored his failing eyesight.

Much impressed with the experiences of the first camp, I invited three boy companions between the ages of nine and twelve to accompany me on a one night's

visit to the mouth of Dead River, several miles north of town. The enterprise was to be undertaken without the assistance of guides or elders, so prone to interfere with the freedom of youth.

Marquette, like most early communities of the north, had no suburbs. When one stepped out of the backyard, the domain of the wild began; for the rigorous winters, deep snow, and lack of conveniences deterred all save Indians from living outside the settlement.

A one-horse wagon hauled us up the lake shore and left the camp outfit beside a pyramidal rock by the mouth of the river, where there was plenty of drift wood for a continuous camp fire. The drift wood was essential, for, as insurance against accidents, axes and guns had been barred from our equipment. Moreover, no one was to risk quicksands by wading in the shallow river or to venture into the pathless swamps and dense forests beyond. These were reported to be occupied by beasts having a particular preference for boys.

NIGHT CAMP AT DEAD RIVER

The tent, when set up, leaned much to one side, in response to a crooked pole; but this, one of the party deemed a virtue, because the sagging canvas would keep our feet warm. Our covering consisted of a single blanket each.

The remaining part of the day was devoted to fishing. After the trout were cleaned and an indescribable batter was prepared for the flapjacks, it was discovered that lard and butter had been left behind. However, burned fish and flapjacks, pried off the frying pan with a knife, were not discouraging. There was an abundance of jam, bread, and cookies, and in the tent was a large beefsteak for breakfast, which, in the absence of grease, was to be broiled on a sharp stick before the fire.

As dusk approached there came from the interior a roaring sound that gradually grew louder. The suggestion that it was a great forest fire sweeping toward the lake and that it would soon engulf us nearly sent the party scampering home. The absence of both smoke and flame, however, seemed to discredit this theory, and the mystery was left unsolved. The wind, shifting to offshore, had brought to us the sound of some large falls, but such a simple explanation was not in the minds of youths about to pass the night in a region that be-



WINTER COMES TO THE SOUTH SHORE

Note the hardihood of the cedars that withstand severe conditions year by year. In the water along the beach is the pan ice which will become a solid sheet as soon as the lake becomes quiet.

came more fearsome as the camp fire accentuated the oncoming darkness.

It fell to my lot to occupy the front of the open tent; but as the warmth of the fire had advantages and the glare would keep away the prowlers of the night, I was soon asleep with the rest. About midnight the fire burned low, and to keep warm we drew the blankets over our heads.

TERROR IN THE TENT

Suddenly I heard a snuffing sound beyond the tent. Heavy feet pressed down on the blanket. Followed the noise of some animal seizing the package of meat and dragging it away!

Still enveloped in the covering, I managed to roll over the recumbent figures of my companions, shouting, "Bears! Bears!" until the closed end of the tent prevented further progress.

There was a medley of outcries as all hands sought to occupy the same place in the rear. One of the party put a climax to the din by firing a revolver rapidly toward the opening. He declared in excited tones that the prohibited weapon had been brought along for just such an occasion, for he knew we were to be in a country filled with dangerous animals.

Under the protection of this weapon, we replenished the fire, fearfully gazing at the edge of the swamp, where to our imagination appeared the glowing eyes of wild creatures held at bay by the blazing logs. The fireflies gliding above the moist ground were sufficiently realistic to deceive us all.

At daybreak the camp was abandoned, but not before large tracks had been noted on the sandy beach. When we appeared at our respective homes before any of our families had arisen, it was discouraging



WINTER'S HANDIWORK ADORNS THE PICTURED ROCKS

In the summer the transparent waters disclose the curved bottom of this rotund and gloomy cavern. When winter paves the floor in white, fills the lower crevices with ice, and forms pendant prisms on the arched entrance, the transformation is one of radiant splendor.



A HANDSOME BUCK VISITS MIDDLE BEACH IN WHITEFISH LAKE SLOUGH

When, as a boy, the author arrived at Whitefish Lake, the slough at its southern end was one of the first localities with which he became familiar. This spot he found later was a favorite resort for deer, which were attracted by the salt lick on its margin and by the abundance of succulent water plants. The slough, about a mile from Whitefish Lake Camp, has remained practically unchanged to the present day. On the sandspit may be seen innumerable deer tracks. On the summit of the hill to the right Jack La Pete built his cabin in 1871 and used it more or less until 1894.

to be told that our fierce visitor was, of course, only a stray Indian dog.

The great changes that have since taken place in this locality include the establishment of the largest charcoal furnace in the world, which is now in operation on one side of the river, spanned at that point by a steel bridge. Just beyond this is the largest concrete ore dock on the Great Lakes, where leviathan freighters 600 to 700 feet long have replaced the birch-bark canoe. A shore driveway, with its multitude of automobiles, occupies the sandy beach that once registered the tracks of many wild animals, and others not quite so wild but equally fond of rare steak.

Early in August one of my youthful companions of the camping trip learned that two miles south of the town and several hundred yards above the mouth of Carp River was a salt lick much frequented by deer. The valley beyond was a wilderness, visited only by a few trout fishermen early in the season. The animals came down the well-forested stream to the lick, almost in sight of the highway following the lake shore.

Here, accompanied by a colored guide, Sampson Noll, the youthful hunter was placed on the top of a scaffold facing a salted log and within an hour had killed a deer, using a Martini-Henry carbine, forerunner of the modern repeating rifle. His effort created great excitement among the boys of the neighborhood; and it was deemed a special honor when I was selected to try for a deer in company with the successful hunter, the exact location of the lick being unknown to the rest of the boys.

Several days later, on reaching the place, we found a high scaffold supported by four poplar trees and accessible by a rickety ladder. Its general appearance indicated that it had been used as a convenient spot for killing deer by some one who found it unnecessary to go much beyond the town limits for his venison.

A TRAGEDY AVERTED

An old log lying near by had been bored full of auger holes, which were filled with salt, so that each rain caused the salt water to overflow, keeping the lick continuously operating. For about ten feet on each side of the log the trees had been removed, affording a full view of any animal standing in the opening.

By agreement I was to fire the shotgun

first, and my companion was to follow with the carbine to insure getting the deer. Little time had passed when a twig cracked and both guns were trained on the log, ready for immediate action. A dark figure appeared! Fortunately, just in time we recognized the shape as a human being, evidently the proprietor of the lick. He stooped and examined the ground for signs of deer. Had he looked skyward and seen the battery trained in his direction and the trembling fingers pressing against the triggers, he would doubtless have had some concern. He soon withdrew.

Again we waited expectantly. Suddenly, and without sound, a deer appeared, standing on the opposite side of the log, with ears erect and nostrils twitching in an effort to detect any danger.

TWO SHOTS AND TWO MISSES

At the count of three I fired the shotgun, and a moment later my companion's rifle cracked! The animal whirled and was gone as silently as it came. Descending, we found that the deer had crossed the stream, and after trailing it some distance without finding any traces of blood, we returned to the lick much disappointed.

Just at dusk, as we were preparing to leave, a deer whistled near by, showing that so much tramping about the vicinity had given the needed warning. Much crestfallen and somewhat sensitive to my companion's declaration that had he shot first there would have been a dead deer, I returned to town, wondering if such a favorable chance would ever occur again.

For more than 15 years this former wilderness area has been replaced by the State penitentiary, a high brownstone building, on the bank of the river just above the point where the lick was, and some 900 convicts gaze wistfully upon the still peaceful valley in which I sought the unfettered creatures of the woods.

Several days after the adventure at the lick old Jack came shuffling along, looking for a job. When he heard of my misadventure with the deer, he told how he had discovered, two years before, a beautiful little lake far back in the unexplored forest, 20 miles east of his home, where deer were so abundant that one could be killed at any hour of the day or night.

Surveyors looking over a route for a railroad between Marquette and a point on Lake Michigan had employed him as a



THE OJIBWAYS USE A DOME-SHAPED LODGE

The Indian to the right is Chief Kawbawgam, who with his family lived on Presque Isle, now a suburban park of Marquette. He reached the unusual age of 100 years, and now a large boulder is his monument in the park. The standing figure at the left is Jack La Pete, who acted as guide for four generations of the author's family. He died in his ninety-eighth year. Such longevity was not unusual among these Indians.

mail carrier in the summer of 1869. When the preliminary survey had been carried to a long, deep gorge, impracticable to bridge on account of the excessive cost, the project had been abandoned. Jack, however, had followed the gorge until he came to a lake about a mile in length, where he saw many deer and much evidence of fur bearers.

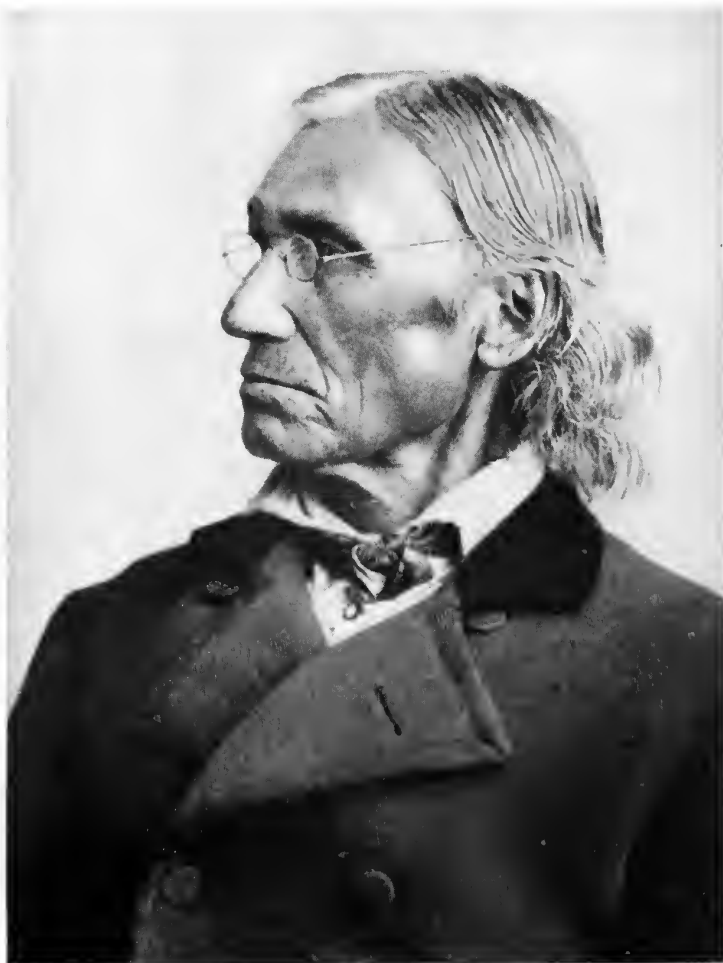
FIRST OF SIXTY-FIVE ANNUAL TRIPS TO WHITEFISH LAKE

Later he had built a halfway shelter at the head of Sand River and a large one at the lake, where he enjoyed a season of successful trapping. It was unnecessary on this trip to carry anything but a couple of blankets, a gun, and a few provisions; for in addition to the cooking outfit at both places, he had an abundance of maple sugar

which could be used to sweeten tea or made into syrup for flapjacks.

Naturally the story excited my interest, and in the second week of August, 1871, with my brother as companion and Jack as guide, I rode in a buckboard to an Indian cabin up the Chocoday River, 10 miles to the south of Marquette. There we passed an uncomfortable night on the attic floor alongside several aged and, to us, ogresslike squaws.

After a hasty breakfast, the packs having been adjusted according to the strength of each member of the party, we followed a fairly good trail to the river. We waded the stream and picked our subsequent course by the trees blazed the year before. The direction was easterly along a ridge covered with maple interspersed with hemlock, where absence of undergrowth made traveling easy.



CHIEF KAWBAWGAM WAS THE GRAND OLD MAN OF THE
MARQUETTE OJIBWAYS

This Indian was born in 1803, at the tribal camp located on the site of the present city of Marquette. He died in 1903, aged 100 years. The author remembers him well. He was a tall, slender, and dignified man. His personality, coupled with his sterling traits of character, made him liked and respected by all who knew him.

Crossing a few swamps, we followed deer trails that avoided all mud holes and fallen timber. At noon we reached Jack's little lean-to at the headwaters of Sand River. The packs, light as they were, had told on us young members of the party. When we started out, we had been inclined to scoff at the weights we were carrying. It is amazing how heavy an object becomes when it has to be carried for hours.

JACK DID NOT ANGLE FOR SMALL FRY

While lunch was being prepared, the sight of the little stream suggested trout,

and, much to the surprise of Jack, we soon caught a dozen small fish. Like most Indians, Jack had a rather hazy notion about trout fishing in interior waters. Lake Superior, filled with whitefish and lake and speckled trout, afforded such an ample supply, easily obtained with a net, that the Indians rarely resorted to the rod. This custom seemed rather queer to persons who have been wont to think of Indians as adepts with fishpole and line.

STRANGE NOISE IN THE WILDERNESS

After we had eaten, the possibility of finding maple sugar led to a search. Jack suspected what we were after and, lifting a heavy flat stone from the edge of the shelter, exposed a tin can filled with pulverized sugar. He had concealed the treasure thus because Bruin has a notoriously sweet tooth and an inquisitive nose.

Toward evening we heard a strange and to us youngsters

rather disquieting noise downstream. It was a confusion of bawls and whimpers, which Jack announced as the family bickering of an old she bear and cubs. Seizing the shotgun, I expressed a preference for bears and suggested that we proceed accordingly.

I had never done any bear hunting, and the opportunity that offered excited my youthful fancy. Of course, the presence of the experienced guide gave me a feeling of confidence that would otherwise have been lacking. I felt that here at last was the time to banish from my memory that humiliating earlier experience when my friends

and I had fled from camp at the very thought of a bear (see page 7). The shotgun was not the best weapon for big game, but my enthusiasm recognized no need for caution.

Jack grimly rolled up a shirt sleeve, exposing a deeply scarred and shriveled arm. The injury, he said, was the result of a fierce encounter with a bear 10 years before. He added that since he was responsible for our welfare the bear hunt was off on this particular occasion.

Not until many years afterward did I learn how uniformly harmless is the black bear, even with cubs. Jack's misadventure had been due to his falling on top of a big bear asleep between two logs. In its endeavor to escape, the animal had seized him by the arm, under the natural impression that anyone taking such liberties should be repelled by force.

We lost little time in starting the next morning along a blazed trail leading to higher ground, from which we gained an occasional glimpse of Lake Superior, an uncertain number of miles away. Along the final mile or so of our route were many deer runways, all converging into larger ones leading toward the small lake, and each filled with fresh tracks of varying sizes. We suggested silence with a view to getting a shot, but Jack, declaring that a deer killed far from camp meant delay and an unnecessary burden, kept up a chatter.

A WILDERNESS HABITATION

At length a small clearing ahead indicated our goal. In the center of it appeared a type of shelter I often had occasion to use in later years. It was shaped like a good-sized wall tent. The side walls were made of cedar logs extending up four feet, and it was covered by a double pitched roof of black ash bark. A narrow opening was cut in the roof for the escape of smoke.

There probably does not exist a more durable, waterproof, and easily prepared covering for a wilderness camp than this. The bark is removed without difficulty from the trunks of the larger trees in the spring, cut into sheets about three by six feet, and put on slightly overlapping. The sheets are supported beneath by cross poles, and cedar strips along the top prevent them from curling. The rich dark brown of the bark might be taken for a covering of well-tanned cowhides.

The white birch bark in use for most Indian tepees along Lake Superior cannot be found in any virgin Michigan forests; for it is a second-growth tree in this region, as in many places elsewhere. Being inflammable and of a flimsy character, birch bark is not to be compared with that of the ash for covering wilderness camps.

FIRST SIGHT OF WHITEFISH LAKE

On depositing our packs, we were naturally eager to see the lake, which lay concealed at the foot of the hill a few hundred yards away. Jack, however, declared the first thing in order was a meal, then the cutting of balsam boughs for the beds, ample firewood, and a general overhauling of the camp.

Finally all these preliminaries were over, and we started down a steep slope for a body of water that, Jack said, had been unvisited by any white man since the days of the Hudson's Bay trappers, a hundred years before. Could I then have anticipated what a large factor this little body of water, since known as Whitefish Lake, was to become in my life and in that of my family, the day would have been even more enjoyable.

A glance to the north disclosed a narrow lake about a mile long, heavily forested along shore with pine and hemlock, except at the end, where a growth of reeds, backed by cedars and black ash, indicated the outlet stream. To the south a beautiful bay, or slough, lay between high hills, with reeds, water lilies, and sandy beaches at the end, through which the inlet stream issued from a gorge filled, as far as vision reached, with stately elms.

This was the center of a fine deer country. The time was to come when about this little slough and in its surroundings more deer would be killed by market hunters and sportsmen than in any similar tract on the American continent. What may be said with more pleasure is that here originated the new sport of hunting with the camera, and that I was to photograph by day and by night many of the deer of this region.

Several natural salt licks located beneath each bank of the slough had been from ancient times the gathering places of all the deer within a radius of 10 or 15 miles. Here, between spring and early winter, these animals could be seen almost continuously. At the time of our first visit none of us knew the cause of this unusual



THE AUTHOR'S FIRST PERMANENT CAMP IN 1882

This structure on Whitefish River was replaced later by modern buildings shown elsewhere (see illustration, page 407). Jake Brown sits at the table and several wild pigeons hang from the ridge-pole.

gathering, for from where we stood it was impossible to see the animals close to the bank, and it was not until years later that the muddy and trampled surface, and the sight of the deer gulping down this saline fluid, revealed to us the presence of mineral springs.

While we were intent on noting the surroundings, Jack pulled from beneath the alders what looked like a log. It proved to be a dugout canoe, made from a white pine log, and containing a paddle and a gill net. Although the dugout had been made for only one person to use in trapping, we were such light weights that it was deemed large enough to carry one of us with the guide when hunting.

Jack soon made a second paddle from a dry piece of cedar. Under the privilege of primogeniture, I claimed the first hunt, which was to be made at the lower end of the lake. Before starting, I asked why the slough, with its many runways, was not the best place to watch, and was told that this locality was reserved for fire-hunting that night, in case we had no success in getting a deer before dark.

Leaving my brother to find his way back to camp, we paddled slowly along the

western shore toward the reeds and shallow waters at the northern end, where Jack predicted it would take but a few minutes to get a deer.

Suddenly he whispered, "Put up your paddle, there is a deer ahead."

At first I could neither see nor hear one, but after passing some reeds bordering a little bay, I saw, standing within less than 30 yards, a small buck, intently feeding on the succulent water plants growing a few inches below the surface.

THE FIRST SHOT

Silently I raised my gun and aimed for the shoulder. As the black smoke and heavy report evidenced the pulling of the trigger, the deer gave a spasmodic whirl and rushed toward the shore at an extraordinary speed, the water flying in all directions. Once more I fired, just as the animal, in a single leap, cleared the first bushes and disappeared.

Reverberating echoes from the high ground across the lake did not drown Jack's chuckle; but he gave assurance of another shot within an hour.

"Another shot!" What a mockery this seemed to one who felt sure that this time



HEAVY SNOW MAKES AN IGLOO OF THE CAMP

Of course, the added covering increases the warmth of the main structure. The temporary shelter protects the table.

the effort had been successful. If not, what chance would there ever be of doing better?

With assumed confidence, therefore, I insisted that we should find the deer dead within a short distance. But Jack only laughed and steered the boat toward the opposite shore. It was evidently his opinion that "buck fever" had given my prey a further lease on life.

Several hours having passed without our seeing anything further, we returned to camp and, after supper, made preparations for fire-hunting, under the primitive conditions employed by the Indians. It was now my brother's opportunity to provide the camp with venison.

At dusk we went down the winding trail illuminated by a flaming torch of birch bark. Placing an old frying pan containing a handful of pine knots in the bow of the dugout and strips of bark near by to be added when more light was needed, Jack and my brother started. I was hardly back in camp before the crack of the gun came to my ears.

After a while the glare of the approaching torch showed Jack leading the way with several pickerel taken from the net at the

entrance of the slough. My brother carried the gun in one hand and in the other a stick upon which were impaled the heart and liver of a deer—proof of the success of the hunt.

The dugout had been passing along the slough when the sound of several deer trampling about in the mud led the hunters to turn the canoe in that direction. Soon two pairs of shining eyes had afforded a choice of victims. When the canoe was about 50 feet away, the luminous eyes had disappeared and two deer had become visible looking at the boat across the water. The gun had brought down the smaller one without a struggle. At the landing the deer was soon dressed and hung up that it might be drained of blood.

THE QUARRY FOUND!

During the night I resolved to arise at daybreak and, without disturbing the others, to seek the place where my deer had gone ashore. I had the vague hope of finding it or, if unsuccessful, of obtaining another animal single-handed.

Leaving camp stealthily, I pushed off in the canoe. Never having paddled in the stern before, I took a few strokes on one

side and then on the other, and in this slow and clumsy fashion reached the marsh where I had shot at the deer.

The dried mud on the leaves showed where the deer had gone ashore. Pushing the bow of the boat into the bushes, I leaped clear of the muddy edge and seized a projecting snag for support. To my joy the snag proved to be the hind leg of my deer, which had died in making the leap that carried it out of our sight!

I sank down, trembling with emotion, and eyed the crumpled body of the little buck. Had a humanitarian witnessed the scene, my actions might have appeared to him like evidence of contrition over the destruction of a beautiful and innocent creature; but the time had not yet come when the camera was to be substituted for the gun in my big-game hunting.

After recovering somewhat from my surprise, I found that nine buckshot had passed entirely through the body, piercing both heart and lungs. This instance is an illustration of how far occasionally a deer will run even when mortally wounded.

As I started to drag my deer through the bushes, the stiffened legs caught, and a heavy pull landed both hunter and animal in the deep mud. It was a difficult task to get the bedraggled trophy aboard.

Near the end of the lake on my homeward trip I roused the sleepers with triumphant shouts, and they hurried down the hill in the belief that their missing companion was in some kind of trouble. Sight of the dugout and its muddy contents, however, soon banished this thought.

Unknown to us at that time was the fact that most deer indicate by their actions the effect of a shot. When missed, they bound away gracefully, with the head erect and the white tail aloft, as if giving a farewell salute to the disappointed hunter. On receiving a deadly wound, they usually run rapidly instead of bounding, with the head lowered and the tail down, wriggling it spasmodically from side to side. It is, therefore, of prime importance that the hunter note carefully the action of the animal at such times.

DEER MEAT CAREFULLY CURED

During the day the meat of the two deer was partly dried in strips before a hardwood fire, and on the following day this task was completed, the weight of the carcasses being so reduced that all the edible

parts of the animals could be carried home—a lesson in conservation never forgotten. In later years I was to learn of millions of pounds of meat left to rot in the woods each fall by wasteful market hunters, who shipped out only the saddles.

In the succeeding 10 years we often repeated this trip, going each way in a single day, extra packers accompanying the hunters so that no meat would be wasted.

In 1880, when the new railroad between Marquette and the eastern end of the peninsula was built across a river about midway between Lake Superior and Whitefish Lake, possibilities arose of a much shorter trail to the lake. The railroad crossing on the river was estimated to be about four miles from each of the lakes. The distance was not known definitely, since the river was not navigable for canoes.

THE AUTHOR NAMES A RIVER

I had camped often at Laughing Whitefish Point on Lake Superior, about a mile east from the mouth of a considerable stream where I hunted and fished. Never having heard a name for this stream, I put it down in my diary as Whitefish River.

I had also followed down the outlet of Whitefish Lake for three-quarters of a mile, but did not know that it was the same stream that entered Lake Superior at the place mentioned. Some old maps called this stream the Au Sable, and located its headwaters in the same region as those of Rock River, which enters Lake Superior several miles to the east.

The maps did not show Whitefish Lake, but I believed that the stream whose lower part I had named Whitefish River was the one draining that lake. If a new route could be opened from the railroad passing along Whitefish River, the distance would be shortened, so that the trip could be made in about three hours instead of two days.

Accompanied by a friend and with Jake Brown as guide, I took a construction train to the river crossing and camped there for the night. It was planned that Jake and I should make the trip to the lake while my companion, Colonel Howe, a Civil War veteran of heavy build, would follow our blazed trail the next day.

Early in the morning Jake and I started, he doing the blazing while I carried the compass, the plan being to keep a southerly course, more or less in sight of the river. The country was heavily wooded, and con-



EARLY TRANSPORTATION FROM RAILROAD TO CAMP INVOLVED A MERRY SLEIGHRIDE

For some years after the permanent Whitefish Lake base was established, a jumper was used to haul in supplies both summer and winter along the blazed trail. Later a good wagon road was made along the same route.

tained occasional swamps, and the stream had many deep bends. Some of these we cut across, but most of the way we kept near the water. By noon we estimated that we had traveled about six miles without reaching the lake.

HUNGER IN THE WILDS

Stopping for a little rest, we opened up the pack ready to do justice to a cold lunch. To my dismay, after Jake had taken out a couple of blankets, he reported that all the provisions had been left behind when the contents of the packs were shifted just before the start. The missing rations included not only the lunch but also the next two or three meals.

Somewhat disheartened, we resumed the trail blazing. About one o'clock, as we passed along a high, well-wooded bank I discovered a small opening in the forest where Jack La Pete had built a deadfall for bears, and thus knew we were within half a mile of the north end of the lake. The rest of the journey to Jack's old shack at the south end of the lake was the most arduous of all; for, instead of keeping on the hardwood ridges, we proceeded in sight of the lake through swamps and much down timber.

When we reached Jack's camp, Jake dropped the pack and filled himself up with water from a nearby spring to give him "sufficient steam for the return trip." I was left alone with the promise that my



A FINE BUCK IS THE TROPHY DISPLAYED AT THE END OF THE LOG CABIN BUILT IN 1886

A. O. Jopling, the successful hunter, is standing beside the spoil of his rifle. The extraordinary size attained by the whitetails in this part of northern Michigan is well shown by the example shown in this photograph.



FOUR GENERATIONS OF THE SHIRAS FAMILY: SPORTSMEN ALL

George Shiras, Sr., 1805-1893; George Shiras, Jr., Associate Justice of the U. S. Supreme Court, 1832-1924; George Shiras, 4th, 1889-1915; George Shiras, 3d, 1859-
 This photograph was taken in 1891 by the author's pulling on a thread running to the shutter. Note his alert expression when facing the camera.



THE LARGE OJIBWAY DUG-OUT CANOE WAS CUMBERSOME

Formerly the Indians made these heavy boats for the smaller lakes and rivers. They were too unseaworthy for the waters of Lake Superior, where the more buoyant birch bark canoes were in general use.

companion would join me the next morning by 10 o'clock. Better time could be made by reason of the trail having been blazed.

While locating this first trail from the railroad to the vicinity of Whitefish Lake, we were surprised to find the virgin forest district marked by many well-defined deer trails leading in all directions. We made so much noise, however, in forcing our passage through the undergrowth and in blazing trees that no deer were seen.

At one point along our route we enjoyed the very unusual sight of half a dozen pileated woodpeckers, or "cocks of the woods" as they are sometimes termed. Apparently this party consisted of a pair with their four young engaged in a family celebration, their loud calls and repeated drumming on a dead pine tree furnishing both vocal and instrumental music for the occasion. Usually these fine birds were seen singly or in pairs, and I never again saw such a gathering.

The next morning I began to feel decidedly hungry, but Jack's lean-to offered only a small can of pork grease wired to the ridge pole. No doubt this find might have proved nourishing; but I had not

reached so desperate a state as to eat it; for the slough at the foot of the hill harbored deer, muskrats, beavers, and pickerel, and the grease might be serviceable in one of Jack's old frying pans.

Sitting about camp, I waited impatiently, and when the noon hour came made further allowance for some unexpected delay. Toward sundown when it seemed almost certain that I should pass another night alone, I decided to seek the slough for something to eat.

NATURE'S MENU UNINVITING

I sat down on a bank near the water where I could see in many directions and placed my little 44 carbine within easy reach. A particularly heavy west wind was blowing at the time, unusual so late in the day. Several deer appeared momentarily on the east side of the slough, scented me, and bounded off with snorts of alarm.

With strange perversity the wind swung back under the hill so that deer approaching from that direction also took alarm. I struck venison off my list of possible provision and wavered between trying for a muskrat or a beaver.

Several of these animals swam by, but always they were too far out in the mud-filled slough to be recovered, if shot. The falling night warned me to make my way back to camp.

As I stumbled through the darkness, I almost fell on top of a large porcupine. This fat animal I classed in the same category as Jack's can of grease, although at the time there was a Michigan law prohibiting the killing of porcupines except for food. It was thought that a starving man, when unarmed, could kill one almost anywhere in the woods.

With sticks from Jack's pile of firewood I soon had a friendly blaze, and lying on my blanket wondered why the resourceful Jake had not returned, even if alone. I feared he had suffered some mishap.

Toward midnight welcome shouts were heard foretelling the coming of a long-delayed meal. As the two wayfarers came within the circle of light, the doughty war veteran was seen leaning on an improvised crutch. He had sprained an ankle when more than half way out, but the vision of the warm little shack and the need of re-joining me had induced him to keep going.

After Jake had thrown the big pack to the ground I said, somewhat eagerly, "How about one of your fifteen-minute dinners?"

"Amend that to two minutes," he replied, as he brought forth to my appreciative gaze ham sandwiches, fried bacon, and trout thoughtfully prepared during the long periods of rest along the way.

The waiting frying pan had the meal heated within the time limit and the coffee pot boiled merrily before I had finished the last scrap. Jake chided me for not having tried roast porcupine, because "it is the only animal that furnishes free toothpicks."

WILDERNESS ABOUT WHITEFISH LAKE

A year later I put up a little lean-to in the clearing made for Jack's deadfall near the bank of Whitefish River, about half a mile below the lake, and still later built there a substantial permanent camp, which has been used each season since, more than fifty years.

The blazed trail from the railroad was shortened and over it, at first, we packed the camp supplies, the heavier articles being hauled in on a jumper owned by a homesteader living near the railroad. The jumper trail was later widened to a wagon road. Many of the photographs and ob-

servations set forth in these records were made hereabout in the following years.

For a time after we located at Whitefish Lake, our deer hunting was done immediately about its shores in order that the carcasses could be transported easily to camp in the dugout canoe. Later, with the spirit of the explorer, we blazed trails back into the surrounding forest, so primeval that it was at that time equaled in few other parts of the United States.

In addition to the visits to the Whitefish Lake area, we made other trips to many parts of the Lake Superior region, the point of departure, unless otherwise stated, always being Marquette. In this way I gained familiarity with the wild life of this vast area and enjoyed varied experiences.

PRANK AND PUNISHMENT

When one endeavors to put on paper the impressions of a long life passed largely in the open, there is an ever-recurring disposition to dwell upon the earlier scenes. The youthful mind is impressionable, and one retains more vivid pictures of occurrences in childhood days than of more important undertakings in later years.

In 1878, with a companion, I made a trip in a rowboat eighteen miles westward from Marquette along the shore of Lake Superior. We camped on a rocky point near shore. Trout fishing was excellent in the vicinity of our camp, but deer were not often seen there, being found more frequently along the sandy beaches of a little lake half a mile inland.

Our boat being too heavy to carry, it was agreed that I should sit on a scaffold in a tree near the shore of the little lake that night, when a full moon would make it possible to shoot accurately. As the moon rose, I was assailed by the most persistent horde of mosquitoes I ever encountered, and I passed a most uncomfortable night, with not a deer in sight.

At camp in the morning, I told of my hard luck. My companion declared he would kill a deer that night, because he had always been "lucky" shooting from this scaffold.

Before leaving camp in the evening for his long vigil he asked whether there were any mosquitoes about. Evading a direct answer, I said, in effect, that he "knew perfectly well that the mosquitoes were seldom bad at this season of the year."

Soon after daybreak the next morning I looked down the beach and saw the hunter

returning. By this time I had begun to fear the consequences of my prank, for some form of retaliation might be expected.

As my friend approached the tent, I noticed that his face and hands were swollen and that both eyes were nearly closed. He was peculiarly susceptible to insect bites. Not daring to make any comment, I was surprised at a similar silence on the part of the victim as we rowed back to town. Gradually the swelling decreased, and I could read a revengeful look in my friend's eyes.

The following day being Sunday, I passed part of the morning on the porch of the hotel, next door to which my friend lived. Here he soon joined me and told me with an air of excitement that he had just seen several four-pound trout off the end of the dock in front of the boathouse.

AN UNEXPECTED DIVE

We hurried to the dock, and at his suggestion I got down on my knees and looked cautiously into the water. On hands and knees with my head projecting over the water, I suddenly received a vigorous push from behind that catapulted me into the deep, cold lake.

As I came to the surface, blowing like a porpoise, I was greeted by an exultant shout, "You will not be bothered by mosquitoes down there."

On one of my earliest camping trips for speckled trout, the old guide, Jack, and I discovered after we had rowed about three miles that the box containing the cooking outfit had been left behind. Naturally, I suggested returning for it; but Jack promptly said it would bring bad luck to do this after once having made the start, and, besides, with our pocketknives it was easy to make what was needed.

In about three hours we reached Shot Point, the first rocks to the east. I began fishing, leaving Jack to put up the tent and start the fire.

On returning with a creel of trout, I found Jack had already replaced the missing outfit. From large sheets of birch bark he had fashioned plates. Cups and other containers were made of the same material, with knives from hardwood and forks of double-pointed twigs.

In the fire was a can of tomatoes perforated in the top to let out the steam, while well beneath the glowing coals half a dozen potatoes were baking. Alongside

Jack placed the dressed trout, wrapped in wet, brown paper. The contents of the tomato can he emptied into a birch-bark dish before the fire, and, fitting the empty can with a wire bail, soon had a kettle for the tea.

At the next meal, after heating a can of beans and removing the contents, he cut and flattened the tin into a frying pan, with a handle made of a split stick. This served thereafter for frying trout or bacon and the all-important flapjacks.

On my suggesting to Jack that several of these fireside conveniences depended upon having canned goods, he picked up a small boulder and explained that, after by heating several of these in the coals and putting them into the birch-bark bowl, one could brew tea and make soup or a stew.

Such was my first lesson in the ease with which supposed essentials might be left behind. The knowledge proved useful when I was forced to travel light, or a capsizing of the canoe sent the outfit to the bottom.

One day in the early eighties my father, an uncle, Major Kennedy, and my brother left Marquette for a trout fishing trip to the mouth of Sand River, on the shore of Lake Superior, twelve miles to the east. I was invited to go, in order to make a fourth for whist, but declined because a companion and I planned for the next day a hunt a mile back from the lake, where bears were reported to make daily visits to some huckleberry plains.

The fishermen had not been gone more than an hour when we learned that bears were being seen daily about the mouth of Sand River, where berries were also abundant. At once we decided to join the fishing party by taking a train that passed within about a mile of their camp.

NO BREAKFAST IN SIGHT

Arriving in what should have been time for breakfast, we found vacant tents and a smouldering fire, indicating that the fishermen had left at an early hour. We ate some crackers and started on our hunt. Tracks and broken bushes showed that bears were about, but none was seen.

We returned to camp with ravenous appetites, but the fishermen were still absent, and we had no means of knowing in which direction they had gone. Again we started out without eating and returned late in the afternoon to find the camp still deserted.



THE AUTHOR'S FAMILY CAMP HAD A HOMEY APPEARANCE IN 1895

It was situated then in the wildest portion of Michigan eight miles south of Lake Superior. Here, after dark, come deer and smaller animals.

For some time we watched the shore with field glasses to detect the first appearance of a boat rounding a distant point. When the declining sun was nearing the horizon, the boat appeared far to the west, but we were disappointed to see a splash made as the anchor was dropped. With the glasses we could see the flashing rods and the dip net used occasionally by Jake as a large trout was hooked. Under these circumstances we knew it was useless to signal and sat waiting in some dejection.

PLAYING "BEAR" FOR A DINNER

Suddenly I conceived an idea. "I think I can bring them back in fifteen minutes," I said, "by playing bear."

Putting on a large black rubber coat found in the tent and wrapping a dark blue shirt about my head to give me the semblance of a bulky animal, I descended the bank on all fours and began moving about on the level white beach. I continued the maneuvers without result for some time and was becoming discouraged, for the hot sand was working into my shoes and up my sleeves.

I asked my companion to take my place for awhile, but he declined, adding that I looked so much like the animal that he had hard work to refrain from shooting me. Becoming thirsty, I ambled on hands and knees out on a stranded saw log, and took a drink of the clear, cold water.

As I returned to the beach my companion called out, "They see you and are coming."

The glasses showed that two pairs of oars were in use and the speed of the boat was indicated by the curling water at the bow. I asked my companion to look into the large tent to see if my uncle's 45 caliber repeater was in the rack, for if he had it with him he might try a shot at the "bear."

The rifle having been found in the tent, I slowly ambled up the bank, not neglecting to stand up and go through the motions of clawing the trunk of a pine in accordance with the supposed habits of big bears.

Both of us retreated through the bushes to the back of the tent. Looking cautiously from our concealment, we saw the boat land about 100 yards down the beach and three men hastily scramble out, laying their oars on the sand to avoid making a noise.

The bear hunters quickly entered the tent, and the rifle was loaded and handed to my brother. He objected that he might miss the bear, and asked his uncle to do the shooting. Excitedly the latter replied that he had killed many bears.

"Besides," he continued, "I wish you to kill this big bear and humiliate your brother who refused to join us because he preferred bear hunting to trout fishing."

He added that he would help finish the animal with the ax and Jake said he would take a hand with the carving knife. Silently the three filed into the thicket, evidently intending to circle back to camp.

After they had gone, we went to the cooking tent and seating ourselves by the camp table in the open awaited the return of the bloodthirsty trio. Soon we saw them, some yards apart, cautiously approaching.

When Jake's keen eyes discovered us, he shouted, "The bear hunt is off and it is time for me to get dinner."

On approaching, my brother fumbled the gun nervously, and our uncle dropped the ax, both apparently hoping they had not been hoaxed, as Jake seemed to suggest.

My companion remarked that we had joined the party to hunt bears, which were said to be numerous in this vicinity, and because it had been raining for several days the bears seemed to wear rubber coats. At the same time he looked significantly at me, still wearing the coat. Jake gave a shout that could be heard a mile.

On one fishing trip we had as a guest an elderly lawyer from Pittsburgh. He became interested in the weird cries of the great northern loon, which, I informed him,

nested regularly on nearby small rocky islets.

Jake was drafted to look for loons' nests, but finally complained of being required to spend half his time in this work, and said it was my duty, under the circumstances, to do something about it. I replied that we would immediately provide the nest and eggs right on our island, and Jake smiled approvingly, for he always liked a joke.

EXTRAORDINARY LOONS' EGGS

I selected a smooth, oval stone about the size of a goose egg and plastered it with wet flour until it was as white as alabaster. To make it more artistic, I dotted it with bright red drops of currant jelly. Although it bore no resemblance to the dull olive-colored egg of the loon, our guest knew so little about nature that he would probably accept it.

The make-believe egg was placed on a rock behind camp, with a few sticks about it to serve as a nest. Jake said it ought to take first prize in an Easter-egg contest.

Our friend viewed the nest and wonderful egg at a distance with rapt attention. When he started forward to pick it up, I remonstrated on the ground that human scent would cause the bird to abandon its nest, and suggested that he return early in the morning to see the incubating parent.

It rained hard during the night. At day-break the flap of my tent was drawn aside and there stood a familiar figure, holding in his hand the little rock washed free of its decorations. "This is the Roc's egg we have read about in mythology," the victim declared, "and I seem to be the loon found at sunrise."



GRACEFUL LINES MARKED THE BIRCH BARK CANOE OF THE OJIBWAYS

This was built by the Indians and used by C. T. Harvey while he superintended the building of the first canal at Sault Sainte Marie, in 1853-4. In perfection of workmanship it shows strong contrast to the clumsy dugouts of the same people (see illustration, page 20).

CHAPTER II

The Author Begins Wild-Life Photography and Invents Photography of Wild Animals by Flashlight

MY CHANGE of attitude from that of a keen sportsman, devoted to the use of the rifle, to that of a sportsman-naturalist, studying wild life with a camera, was a gradual development.

When my vacation became limited to summer months in the closed season, with an occasional brief hunt in the fall, the "call of the wild" was intensified by the confinement and exactions of city life.

On seeing the wild animals in the woods and about the waters, I missed the thrill of my shooting days. To paddle within range, or cautiously approach some clearing, and then see an animal slink away became monotonous, for I was accustomed to a keener and more exciting sport.

CAMERA DISPLACES GUN

It was this feeling that led to my suggesting to Jake Brown, a worthy successor to Jack La Pete, the possibility of photographing a deer. One afternoon we prepared the flat-bottomed hunting skiff for the experiment, with a few green boughs in front screening the camera.

My instrument at this time was a 5 x 7 landscape camera with a single lens, of slow speed, which had to be uncapped when an exposure was made. A tripod was generally necessary. In some respects this instrument proved more satisfactory for scenic pictures than some modern outfits; for the need of the tripod in focusing and in the study of the field to be included, besides the small aperture of the diaphragm, resulted in well-defined negatives, and precluded the carelessness so common with a snapshot camera.

This adventure was signalized in my diary for 1889 as follows: "Whitefish Lake, July 7-9.—First day wounded bear on way out; saw two deer in camp clearing. Second day tried photographing a deer."

As we entered Whitefish Lake, an unusually large buck was seen standing upon a submerged rock opposite us. Paddling slowly through the reeds, we came to open water fronting the animal and within 40 feet of it. It stood in a striking attitude. At this instant the boat, fortunately, ran

on top of a sunken log, and thus was steady for the picture.

Quickly I removed the cap from the lens and then replaced it. The deer, detecting this light movement, ran a short distance, then stopped, with head high in the air, and gazed anxiously in our direction.

TWO PICTURES SPOILED AT ONCE

Meanwhile I had replaced the slide, reversed the plate-holder, and had time to make a second exposure. With a single leap the animal cleared the bushes fringing the water.

More excited than if I had killed this splendid specimen, I picked up the slide to cover the last exposed plate, only to see the light-colored negative staring me in the face. I had withdrawn the outer slide while watching the deer moving off, thereby destroying the first negative and not exposing the second.

Jake, of course, could not understand how it was possible to spoil two pictures by a single mistake. Without any undue discussion about the manner in which I had blundered, we headed the boat for the slough, where a large doe was found ready for the next effort.

Somewhat suspicious of the partly screened boat, she allowed time for the removal of the cap, but before it could be replaced ran back into the forest. When the plate was developed, there could be seen the faint outline of the doe, and then a long white streak representing her retreat.

From this experience it was apparent that only by the best of luck was it possible to get pictures of deer with such an outfit, and while conditions had favored the initial effort, "buck fever," as in earlier days, had brought complete failure.

THE FIRST PHOTOGRAPHIC APPARATUS OF ITS KIND

Several seasons previously a friend of mine had procured a 4 x 5 outfit, called the "Schmidt Detective Camera," having a high-grade, rectilinear lens, with a fairly rapid shutter, which could be set and released by a string and button on the



THIS GOLD MEDAL WAS AWARDED TO THE AUTHOR AT THE PARIS EXPOSITION, 1900
(SEE FOREWORD, PAGE VIII)



THE JURORS AT THE PARIS EXPOSITION PRESENTED THE AUTHOR WITH A DIPLOMA
TO ACCOMPANY THE MEDAL SHOWN ABOVE (SEE PAGES 82-83)



THE AUTHOR WAS HONORED AT HOME WITH THIS GOLD MEDAL AT THE ST. LOUIS EXPOSITION, 1904



RECOGNITION AT THE ST. LOUIS EXPOSITION CAME IN THE FORM OF THE GOLD MEDAL SHOWN ABOVE AND THIS DIPLOMA



A LARGE WHITE-TAILED BUCK FEEDS ON WATERPLANTS IN THE SLOUGH

The tense excitement of approaching a big deer in such an environment and getting a successful photograph from the bow of a canoe can rarely be equaled by a stalk with a gun.



HERE THE AUTHOR'S WILD-LIFE PHOTOGRAPHY HAD ITS BIRTH

This photograph illustrates the method of taking daylight pictures of deer by means of a string running from a seat in a tree across the slough to a camera set near the opposite shore. Whenever a deer passed within the focus of the lens, a sharp whistle brought it to a stop and a pull on the string recorded the scene. To the left of the camera may be seen a deer, with its ears turned forward looking toward the operator.

outside of the box. This apparatus, which was the first of its kind, in many ways equaled more recent cameras in effectiveness, and for my purpose proved very satisfactory; for the plate-holders and lens were inclosed in a light, tight, waterproof box.

Using this camera during the next season, I was able to obtain several good pictures of deer. The lens, however, was of short focus, and it was necessary to get within about twenty-five feet of an animal for satisfactory results—a difficult feat in bright sunlight.

CAMERAS OPERATED FROM AFAR

I tried sitting in a blind near a runway or where the deer came to feed, but the shifting air currents usually betrayed my presence before the quarry approached close enough. The difficulty emphasized the difference between shooting an animal at a distance and trying to photograph it within a few yards.

It seems odd now that in the beginning I selected as the object for the first camera hunts the most cunning and elusive of the deer family instead of trying an easier subject, like a porcupine, a squirrel, or one of the many half-tame birds nesting in the clearing about my camp. Of course, the explanation lay in the fact that I simply wished to hunt deer, and the camera afforded the means of gratifying this desire.

The difficulties I experienced in approaching the deer near enough by daylight to get good photographs with my small, short-focus instrument caused me to try to contrive some other method. To accomplish this, I placed a camera concealed on a support a few yards offshore from a place much used by deer along the border of the slough.

A small comfortable platform was built in the branches of a spreading tree on the opposite shore, nearly 100 yards away, and from it extended a strong cord suspended by eye-screws set in tall stakes made from small saplings, placed at intervals across the slough. The cord was firmly tied to the last stake, which was more loosely set than the others and was located near the camera. Between this last stake and the camera a slender rod was planted and connected with the stake by a rather slack thread, and with the lever of the camera shutter by a thread drawn taut.

By this arrangement the weight of the long cord and the pull on it from the pres-

sure of the wind were taken by the last stake and the loose thread, in order to prevent the shutter's being prematurely operated. This stake was set so loosely in the mud that a strong, steady pull on the cord would sway it away from the camera and draw taut the thread to the rod. As the rod bent with the pull, the shutter was sprung and the picture taken.

Whenever a deer passed in front of the camera, a sharp whistle by the operator would cause it to stop; then a steady pull on the cord released the shutter. The sport proved most interesting and exciting, for the deer could not see, hear, or scent the photographer. The approach of the deer to the focus point of the camera gave all the tenseness of feeling provided by hunting with a rifle, but the cord was pulled instead of the trigger.

A battery of several cameras, each with its cord, was sometimes located on the bank of the slough and operated from the same platform. In later years I used the same method with success in photographing nesting birds while I sat at a distance in a bush blind.

Since daylight photography of deer usually requires direct sunlight, with the animal free from interfering brush, it is easy to understand how a close approach on foot is difficult, although in a canoe one may frequently surprise a deer at a short bend in a stream, or get excellent pictures at close range when hiding in a favorably located blind.

Such pictures of deer are best obtained in the early summer months, when the animals are seeking their favorite aquatic plants or going to watercourses to escape the flies. Then they are easily located and the pictures can be taken in exposed situations, where the illumination is good and no brush or trees cut off the view.

THE AUTHOR DEVISES METHODS BY WHICH ANIMALS TAKE THEIR OWN PICTURES

It was not long after I discovered the difficulty of getting within photographic distance of deer, whether in a canoe or on foot, that the idea suggested itself to conceal a camera 25 feet from a runway, or near a narrow part of the open shore, so that a taut thread running from the shutter to a stake, tree, or log would result in a picture if any animal touched it in passing.

Even then, when I might be miles away,

the lingering scent from the much-handled camera required the wind to be favorable when a place was selected. Elk, moose, and caribou will push against, and usually break, an intervening thread, but a white-tailed deer in many cases will retreat the instant it feels the slightest pressure on its breast or fore legs. To photograph a deer, the line must be so near the ground that it may be overstepped occasionally, and it may be tripped even by a wandering porcupine (see page 80).

When, however, deer are in a playful mood, or rushing through the water or along the shore to escape the flies, they are unable to check themselves on touching the thread, and the result is a picture full of action (see page 39).

By throwing a handful of salt on the beach and running the thread across the spot, one may easily obtain pictures of the animals pawing the earth in search of the salt they crave (see page 39).

INVENTION OF FLASHLIGHT PHOTOGRAPHY OF WILD LIFE

My first flashlight pictures of wild life were taken by the use of hand apparatus from a canoe. They included deer, elk, moose, and smaller animals. In this chapter an account is given of my first efforts and final success in inventing this method of photographing wild animals.

The next step forward was the invention of methods by which animals took their own pictures by automatic flashlight. This will be described in Chapter III.

It now seems strange to recall the time when it was considered sportsmanlike to hunt big-game animals at night with a jacklight in the bow of a canoe; yet when I first began shooting deer in the early seventies, "fire-hunting," as it was then called, not only was deemed entirely proper, but a very agreeable diversion. It was the usual method resorted to in getting a supply of venison for use in camps pitched near small lakes or sluggish streams, especially if still-hunting during the day had proved unsuccessful.

Even at that time, to most of us, the real pleasure in hunting at night was not so much the actual shooting as the keen enjoyment derived from paddling quietly on the winding streams and along the well-wooded shores and bays of some inland lake, where in the quietness of the night every sound was audible, and one learned

to recognize the different animals before they came within the circle of the light. Unless the primary object was to obtain meat for camp, it was disappointing if a deer was killed within the first half hour and the hunt thus ended.

Another method of night hunting was the use of a headlight on shore, the hunter quietly wandering about in the blackness of the forest looking for a pair of gleaming eyes, 50 or more yards away, and then trying to put a rifle ball into the narrow space between those brilliant orbs. This required an accuracy of aim, a knowledge of the woods, and a skill in still-hunting quite up to the standard in daylight shooting.

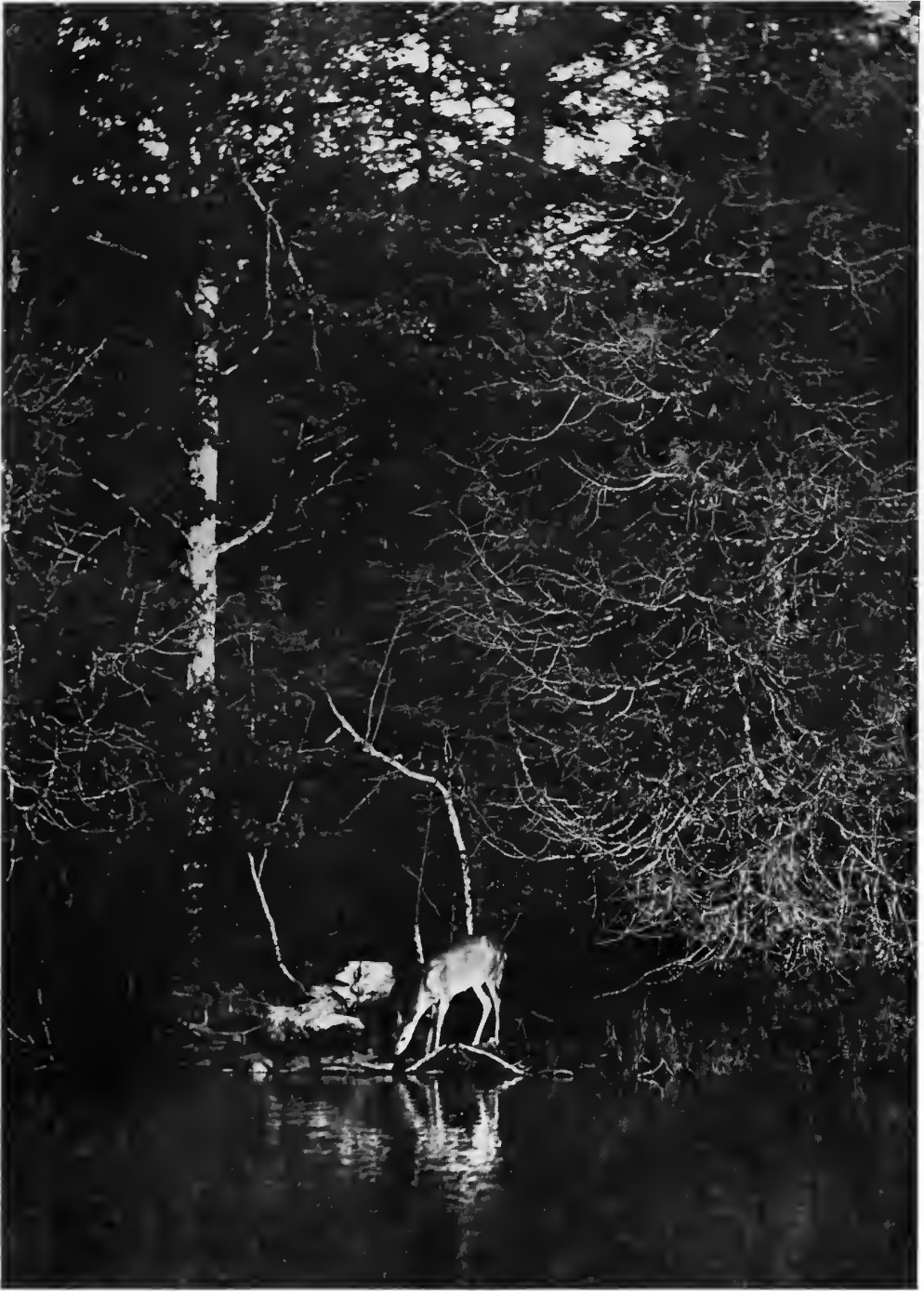
This method I copied from the Ojibway Indians, then the principal tribe on Lake Superior; and the light I first used was a crude affair, made by burning pitch pine in an old frying pan placed in the bow of the canoe, and adding pieces of birch bark to increase the light when I was about to shoot. Since the rays of such a light were not concentrated and were affected somewhat by smoke, the deer were usually shot within 50 feet or less.

Later I used a small lantern, with a good reflector, and since experience soon showed that a deer had little chance of escaping a charge of buckshot, my equally young shooting companion and I agreed to use only a rifle. A little later we spared both does and fawns when night shooting.

MARKET HUNTERS MENACE DEER

With the opening up of northern Michigan by several lines of railway, the market hunters came; and so destructive was their use of the jacklight, both in a canoe and as a headlight on a blazed trail—many of them killing from 100 to 200 deer in the early fall months—that it soon became apparent, in the absence of prohibitory legislation, that the deer were doomed. A particular menace lay in the fact that most of those killed at night were does. Before any legislation had prohibited fire-hunting in Michigan, I had given it up and assisted in the movement to end such slaughter.

This form of sport was attended by the peculiar and never-ending fascination of canoeing at night, when the evening stillness brings to the keen ear the crooning of the porcupine, the chirping of the cricket, the croaking of the frog, or the soft flutter of an owl circling on wings of velvet. When a muskrat jumped off a log or a pickerel



A VISITOR COMES TO THE LAKE BY DAYLIGHT

One of the fascinations of wild-life photography is the constant succession of beautiful scenes its devotee enjoys. This doe in bright rusty-red coat came out of the dark green forest and was drinking when her photograph was taken with a telephoto lens halfway across Whitefish Lake.



A FLAT-BOTTOMED HUNTING SKIFF WAS USED FOR CAMERA WORK

In all sorts of situations, whether in daylight or at night, this craft proved its usefulness. It drew so little water that it could penetrate shallows unapproachable by other means and it was steady and hard to capsize.

in the shallow water darted against the side of the boat, one gave an involuntary start at sounds magnified a dozen times by the high tension of the watcher.

To the straining eye of the one in the bow, intent on the diverging avenue of light cast by the jacklight revolving on its staff, the overhanging branches and the bleached or gnarled trunks assumed weird shapes.

When, finally, there was detected the intermittent swish-swish-swish of a deer wading knee-deep in search of tender roots, one tried to pierce the darkness ahead for the first faint glimmer of reflected light from the deer's eyes, which would become brilliant orbs as we approached.

Then the blue, translucent glow of the watching eyes appeared, and as the approaching light revealed the graceful image of a deer, the time to shoot had come.

Sometimes the novice, seeing the momentary glow of a firefly or the glistening dew-drop on a reed, imagined he saw a shadowy form and fired at the apparition.

NIGHT PICTURES—BIRTH OF AN IDEA

Later, when I preferred hunting with the camera, after an unsuccessful day either because of cloudy weather or inability to locate any deer, I often felt how unfortunate it was that I could not go out after dark and take pictures of deer with the aid of a jacklight with the same ease that I formerly got their carcasses.

Having taken daylight pictures of deer in several ways, I began to consider whether there was any possible means of taking photographs at night, when the deer were much more active and could be approached more easily than at other times, and of thus reviving, in a harmless but interesting way,



THIS WAS THE FIRST WILD ANIMAL TO TAKE ITS OWN PICTURE

Soon after the author had set up his earliest automatic device with a taut cord stretched from the camera across the runway the deer tripped the shutter. The photograph, made by daylight, June, 1890, shows the gaunt condition of the animals during the fly season in northern Michigan.

jacklight hunting, so little known to sportsmen of the present day. Having had an extended experience in hunting with a gun under the light, I had little doubt about getting close enough for pictures, provided the flashlight powder was a sufficiently powerful illuminant and had the requisite speed.

In the first use of the flashlight I met with many adventures and much ill-success, because of the slow magnesium powder then manufactured and the still slower means of ignition methods that were fairly satisfactory for interior pictures, but useless on damp or windy nights in the open, when the flash must be fired the instant the deer come into focus.

SUBJECTS RAN AWAY

Some deer ran away just as I ignited the powder, and others, staring at the lantern

light, gave a convulsive movement of the head the instant the slow powder exploded, so that all such pictures were worthless. This was always keenly disappointing, although I thoroughly enjoyed the effort of getting within 25 feet of a feeding deer and the excitement both aboard the canoe and on shore when the spluttering flash went off.

Gradually I constructed an apparatus that could be fired with ease and certainty, and as the speed of the powder was improved, all difficulty in getting night pictures from a canoe vanished.

I first mentioned the new idea of night photography to Jake Brown in the summer of 1889, but he was still a trifle irritated over an experience of the previous fall. One day after the season opened I had photographed a fine buck and shot at it afterward as it ran away, badly wound-



ONE ENJOYS THE OUT-OF-DOORS ON A CAMERA HUNT

The author, standing on a high bluff on the eastern shore of Whitefish Lake, is watching for deer that may come down to the water, but he means them no harm.



WHAT IS THAT?

The author took this picture in daylight by pulling a string leading across the slough. A whistle caused the young doe to pause and raise its head in innocent curiosity.



THE MYSTERY OF A NEW CALL NOTE

The interest of this large doe is aroused, but she is not alarmed by the whistle of the photographer and gazes toward him as he pulls the string and records her.



HIGH LIGHTS GLEAM AGAINST THE NIGHT

Now and then the flash was fired at such a distance that little more than the white parts of the animal was brought out, producing impressionistic pictures. This is the author's second successful flashlight.



UNEXPECTED GAME—THE APPARATUS

One day in July, 1892, while in a blind watching for deer, the author noticed some cedar birds flying out over the water of the slough in pursuit of small insects. He set up a camera, with a branching stick about three feet away. The usual pulling string was attached to the shutter and the birds promptly utilized the perches.

ing the animal and causing half a day's search before it was overtaken and put out of misery.

The experience had led Jake to exclaim that if the camera must be used, the best thing to do was to shoot the deer first and photograph it afterward!

Since the hunting season would not open for several months, however, he got the boat ready for the night, while I attempted to devise some sort of flashlight apparatus. A small hole was made in the center of a tin plate, over which was placed a strip of oiled paper that would burn readily when ignited underneath, and on top of this

was placed the magnesium powder. The approach was to be made in a canoe as usual when using a jacklight.

FIRST ATTEMPT PARTLY SUCCESSFUL

The first effort was entirely successful, so far as getting within range of the deer was concerned; but just as the lower end of the paper fuse began burning the deer ran off with a snort of disapproval, the flash taking place after it was out of sight.

Jake, as might have been expected, indulged in his usual guffaw, while I hopefully prepared another charge. As we advanced we saw a large doe standing on the sandy beach apparently much interested in the approaching light, and when the boat was within 25 feet I fired the flashlight.

When the negative was developed, the body of the deer was shown sharply defined, but the head had moved so violently that the animal appeared to be decapitated. This unexpected result was discouraging, but I made several trials the

following night. Again the pictures were nearly worthless for the same reason, the powder being too slow for such an active creature as a deer.

Later experiences proved that even with this crude apparatus a good picture might have been taken occasionally had the flashlight been discharged when the deer had its head down or stood turned away from the water.

The ensuing winter I heard of a flashlight apparatus designed for taking pictures in theaters, ballrooms, and other large interiors. This consisted of a metal standard supporting three circular alcohol



UNEXPECTED GAME—THREE SITTERS

With the apparatus shown on the opposite page, the author photographed first a single bird, then two, and finally three. The birds also used the camera as a perch, and one was on the corner of it when the companion picture was taken.

lamps into the flames of which could be projected a spray of magnesium powder by means of a rubber bulb connected by tubing with a receptacle containing enough powder for half a dozen flashes. This apparatus, with its great power of illumination and ease of manipulation, seemed suitable for solving the problem.

UNEXPECTED PYROTECHNICS

On the first dark of the moon of July, 1890, I left camp in a canoe with the new outfit in the bow and the ever-faithful Jake astern, going downstream from camp to avoid the winds of the open lake. My plan was to use the jacklight to locate the deer; then, on approaching it, to cover the jack and utilize the three lamps and a reflector when discharging the flashlight powder.

In one place it was necessary to lift the canoe over half-submerged rocks; but, since we both wore gum boots, this was easily done. Shortly afterward it was

realized that this little portage had probably saved the flashlight hunter from severe injuries.

After we rounded the next bend, a pair of glowing eyes attracted our attention, and in a moment the jack was covered and the three lamps were ablaze. As we approached, the deer jumped to one side, making it necessary to change the course of the canoe, for I had not then devised a revolving table capable of covering any quick movement of an animal.

As I turned to whisper instructions to Jake, my elbow caught on the rubber tubing, and toppled the entire apparatus into the canoe. The cap of the reservoir became detached, permitting the escape of all the powder, part of which clung to the wet surface of my rubber boots, the remainder going into the bow, where it caught fire from the overturned lamps.

At once came a tremendous explosion of the drier powder, and the damper portion gave forth a brilliant spluttering flame with

a cloud of stifling smoke, compelling me to leap overboard in order to extinguish the blaze on my boots and later that in the boat.

Since I was facing the paddler when the mishap occurred, and because much of the powder was wet, my eyes were protected, but the incident gave a timely warning of the caution necessary in handling such an explosive.

When Jake learned that no particular harm had been done by the explosion beyond the puncturing of a chimerical scheme, he gave vent to unrestrained mirth. Standing waist deep in the slowly moving current, my hands smarting from the touch of the flames, and the little camera floating about in the murky waters, I was in no mood to appreciate the humor of the situation.

JAKE GETS A DUCKING

I uncovered the jacklight and turned its rays toward the stern, and the sight of Jake's hilarity, with its superabundance expressed by his whacking the paddle on the water in rhythm with each outburst, caused me to give an upward lift to the already elevated bow of the canoe. Down went the stern until only Jake's eyes showed above the surface. Every sound was stifled except a little sputtering.

As Jake struggled to his feet, a grinning countenance showed his willingness to take good-naturedly this somewhat rude form of reprisal. In a few minutes the boat was ashore, the water removed, and the camera found on a near-by sand bar. While returning to camp, my now sympathetic assistant attempted a diversion by pointing out in vivid language how surprised the deer must have been "when the moon blew up," but his monologue was not interrupted.

During the succeeding months I experimented with a new powder, called blitzpulver, a compound possessing great brilliance and rapidity, and requiring only an apparatus that could be quickly and safely handled to insure satisfactory results. From my training as a sportsman the idea of a pistol flashlight soon suggested itself.

That winter I made a tin box an inch deep and seven by four inches across, containing an iron bed-plate attached to which was a spring-actuated firing-pin that could be released by a trigger beneath the box. I used for ignition a capped, but empty, pistol cartridge, which extended

through the upright shoulder far enough to penetrate an opening in a pill-box containing half an ounce of powder and resting against the shoulder on the bed-plate.

This contrivance, when tested, showed it could be fired with the quickness and certainty of a pistol, the strong metal bed-plate protecting the hand when the mechanism was held overhead.

On returning to camp in the summer of 1891, I found that Jake was otherwise occupied, and the next experiment had to be tried with a different paddler in the stern. Fortunately, a good substitute was at hand.

JOHN HAMMER JOINS THE AUTHOR

For some years previously I had employed, occasionally about the camp, but more frequently in fishing along the shore, a Norwegian named John Hammer. Although he was a machinist by occupation, since he had come to this country, in the early eighties, his racial fondness for the water had caused his employers to take him on camping trips, and his expertness as oarsman, paddler, and operator of a naphtha launch had finally led him to become a guide during the summer and fall months.

Sending for John, I explained that he was to take on for an indefinite term a novel occupation, that of "a flashlight guide." Neither of us anticipated his continuance in that capacity for more than 40 years. He has been in the work to the present, and gone on expeditions throughout much of this continent.

John accepted the invitation with cheerfulness that was surprising, for in those days the idea of using a camera instead of a gun did not take very well with most guides, who naturally thought that in hunting big game there should be something more substantial to show than the image of what, in the flesh, represented a fine stew or roast.

Perhaps part of the explanation of John's readiness lay in the fact that at his former home in Christiania he had served as an apprentice in an optical works and had always taken considerable interest in photography. This caused him to view his new duties with a seriousness and appreciation promising well for my future efforts.

One night, about the middle of July, I put the new apparatus into the canoe and started from camp up the river with the confident belief in a greater measure of success than had heretofore fallen to my lot.



WHITE-TAILED DEER TAKE THEIR OWN PHOTOGRAPHS BY DAYLIGHT

The camera placed on an abandoned muskrat house recorded these two does as they trotted along the shore and broke the string to the instrument in attempting to escape the torment of the flies. The picture was obtained in 1890.



LURED BY HIS APPETITE, HE LEAVES HIS LIKENESS

The buck in the velvet photographed himself by touching the string as he pawed in the sand for more of the salt that had been scattered there as an attraction for his kind. The picture was taken in 1890 before focal plane shutters were available.

While we were on the way to the lake, several deer bounded off, but too far away for a picture. Passing along the reed-bordered part of the lake shore, we did not look for animals. We entered the slough, the open shore of which afforded a less obstructed view, with no idea of seeing a deer for several hundred yards.

We were, therefore, surprised to discover the shining eyes of what proved to be a yearling buck, only a few feet beyond old Jack's landing. There, as a boy, I had brought a little buck in triumph as the first victim of my gun. What a coincidence if, on the same spot, I should now obtain an image much more lasting than the vanished one of years ago!

The deer viewed the approaching light with unusual curiosity, raising and lowering its head as if to look under or over the mysterious light. Just as his neck was craned and his head elevated, I fired the flash.

Camera hunters and deer were equally blinded, for at that time we had not learned the advantage of closing one eye when the explosion took place. Before our vision had returned, the deer was heard struggling through a mass of alders.

FIRST GOOD DEER FLASHLIGHT

Without making another trial, we hastened to camp. The developed plate showed the little buck in the center of the scene, with the foreground of reeds and a background of alder and cedar. This was the first successful effort to make a photographic record of an animal on its midnight rambles (see page 43).

I soon learned that night hunting with the camera possessed a greater attraction for an experienced sportsman like me than hunting with a gun. In 1889, 1891, and 1892, I endeavored to convey this information to others through the columns of *Forest and Stream*, then edited by my friend Dr. George Bird Grinnell. These ideas have been so fully sustained by the experiences of succeeding years that they may be quoted in part here:

"Selecting a dark, warm night, a flashlight hunter prepares his cameras, lights the jack-lamp, loads his flashlight apparatus with magnesium powder, and in his canoe pushes out into the silent waters of the lake or river. The paddle sends the slight craft ahead so easily that no sound is heard except a gentle ripple, unnoticeable a boat's

length away. The wooded banks are wrapped in deepest shadow, only the sky line along the crest showing their course.

"At the bow of the boat the bright eye of the jacklight is turning from side to side, cutting a channel of light through the darkness, showing, as it sweeps the banks, the trunks of trees and tracery of foliage with wonderful distinctness.

TWO BRIGHT BALLS SHINE BACK

"Soon the quick ears of the men in the boat detect the sound of a deer feeding among the lily pads that fringe the shore. Knee deep in the water, it is moving contentedly about, munching its supper of thick green leaves.

"The lantern turns about on its pivot and the powerful rays of light sweep along the banks whence the noise came. Suddenly two bright balls shine back from under the fringe of trees a hundred yards away where the deer has raised its head and is wondering what strange, luminous thing is lying out on the surface of the water.

"Straight toward the mark of the shining eyes the canoe is sent with firm, silent strokes. The distance is only 75 yards, now it is only 50, and the motion of the canoe is checked till it is gliding forward almost imperceptibly. At this point, if the hunting were with the gun, there would be a red spurt of fire from under the jacklight, and the deer would fall or go struggling and plunging toward the brush; but now there is no sound or sign of life, only the slowly gaining light.

"Twenty-five yards now, and the question is, will the deer stand a moment longer? The flashlight apparatus has been raised well above any obstructions in the front of the boat, the powder is ready to ignite at the pull of a trigger; everything is in readiness for immediate action. Closer comes the boat, and still the blue, translucent eyeballs watch it. What a strange phenomenon this pretty light is! Nothing like it has ever been seen on the lake during the days of its deerhood.

A CLICK, A WAVE OF LIGHT, THEN DARKNESS

"Fifteen yards now, the form of the deer appears, and the tension is becoming great. Suddenly there is a click, and a white wave of light breaks out from the bow of the



THESE FLASHLIGHT HUNTERS IN 1893 WERE THE PIONEERS OF THE SPORT

The hunting skiff and equipment went out for game with two cameras in the box on the revolving table in the bow. On top was the jacklight which located the game. The flashlight in the author's hand was fired by pulling on a trigger (see text, page 62). This particular picture was taken by a flashlight and camera arranged on shore and operated by pulling on a string held in the author's left hand. The flashlight apparatus shown was the one used in practically all the author's night pictures of deer and moose taken from a canoe.

boat—deer, hills, trees—everything stands out for an instant in the white glare of noonday. A dull report, and then a veil of inky darkness descends.

"Just a twenty-fifth of a second has elapsed, but it has been long enough to impress the picture of the deer on the plates of the cameras, and long enough to blind for the moment the eyes of both deer and men. Somewhere out in the darkness the deer makes a mighty leap. He has sprung toward the boat, and a wave of water splashes over its occupants. Again he springs, this time toward the bank. He is beginning to see a little now, and soon he is heard running, as only a frightened deer can, away from the light that looked so beautiful, but proved to be so terrifying.

"What an account he may have for his

* By George Shiras, 3d, in *Forest and Stream*, September, 1892.

brothers and sisters of the forest of a thing which he himself would not have believed if he had not seen it with his own eyes. In the boat, as it slips away from the bank, plates are being changed and the cameras prepared for another mimic battle."*

The need of sunlight and the fact that the shade of foliage, a passing cloud, or shifting light may throw the deer into heavy or broken shadows are reasons why a camera set out at night with the flashlight is often preferable as giving more definite results.

In the course of time it became plain to me that the easiest and most satisfactory method of picturing wild game was through the use of the flashlight, for by far the greater number of wild animals are nocturnal. When occasionally seen in the daytime, even in favorable light, they can rarely be approached sufficiently near for a photograph.

It was many years before anyone else made the effort, however; for it required the combination, rare at that time, of naturalist and photographer. The experimenter must know not only how to use flashlight powder but also how to approach animals at night.

The effective illumination of modern flashlight powders out-of-doors is limited in animal photography to about 50 feet, unless a very heavy charge is used, in conjunction with a long-focus lens. The direct and collateral rays of this powder, however, have an extraordinary range. Homesteaders living as far as four or five miles from the author's camp for some years noticed at intervals sudden glares of light on the sky overhead, and through inquiry finally traced the origin of this occurrence to the firing of the flashlight when pictures were being taken near the camp.

This led to experiments to learn more concerning this light effect. About an ounce of flashlight powder was fired one night at Whitefish Lake Camp, surrounded by high trees, while well below the horizon at Marquette, 20 miles away, observers were to note the result. They reported a bright illumination resembling heat lightning, not only above the camp site, but extending apparently five or six miles along the horizon. Subsequent trials gave similar results.

Flashlight rays will penetrate clear water for a considerable distance at night, making possible subsurface pictures so difficult to obtain in the daytime, and also will permit the photographing of the interior of a room through closed windows when the camera and flashlight are at a considerable distance on the outside, an accomplishment which of course is impossible in daylight.

CURIOUS EFFECT FROM CROSS RAYS

One warm summer evening at Whitefish Lake I paddled several friends up to the slough to show them some deer with the jacklight. Instead of the small jacklight used to approach close to deer in taking flashlight pictures, I took a large lantern with a parabolic reflector, similar in form to the headlight of a locomotive. With this the form of the deer could be seen plainly at a distance of 100 yards. At the slough the canoe was stationed about 50 yards offshore with the powerful light elevated to shine over the tree tops and

ready to be lowered when a deer should come to the edge of the water.

We had been there only a few minutes when the band of light from our lantern over the tree tops suddenly became more brilliant and showed at the same time a quivering motion which quickly ended. As we uttered an exclamation of surprise at this, we heard the dull boom of a flashlight set for muskrats on the river a mile away to the north.

The rays of our lantern were extending to the eastward at a right angle to the direction of the flashlight. Apparently the fluttering of our lantern rays had been caused by the crossing rays from the flashlight which were otherwise invisible to us.

To investigate this phenomenon more definitely, we returned to the slough two nights later and turned the light of our big lantern over the tree tops as before. By prearrangement a flashlight was to be fired near the same place on the river as before at a time agreed upon.

As the moment for the test approached, we all looked up intently at the broad band of light from our lantern. Suddenly the fluttering light appeared in it. I exclaimed "listen," and after an appreciable interval came the boom of the flashlight. The source of the effect was certain, but what is the explanation?

DOE AND TWIN FAWNS

The picture of the white-tailed doe and two fawns is an example of the unusual results that at times may be obtained by night photography and that add so much zest to this pursuit.

One quiet, warm evening early in July, 1896, we left camp in the canoe for the south end of Whitefish Lake, where it was reasonably certain we should find several deer on our arrival or after a short wait. On the way I suggested crossing the lake to look for a deer in a little bay where an old and long-abandoned logging road came down between high bluffs, the only place accessible for deer coming to the water in half a mile of shore line.

When the jacklight began to bring the shores of the bay into faint relief, we saw a pair of glowing eyes, but before the body became distinct the deer gave a snort and, running up the trail a short distance, stopped. We backed the canoe off a little, and the animal returned to the water; but as we approached with the light again, it bounded off.



THE FIRST SUCCESSFUL FLASHLIGHT PHOTOGRAPH EVER MADE OF A WILD ANIMAL

In the course of the author's experiments while inventing a method of flashlight photography of wild animals triumph came in July, 1891 (see text, page 40). This yearling buck was photographed as he stood, head erect, watching the jacklight on the approaching canoe.

This performance was repeated several times, indicating clearly that the animal was either one I had flashed before or one that had providentially escaped a load of buckshot fired by a pot-hunter using a headlight. Growing discouraged, I gave the signal to continue down the lake; but John, believing the deer would soon grow less suspicious, held the boat a few minutes longer.

Suddenly, on the right, I heard the tell-tale sound made by a deer entering the water, and turning the jacklight in that

direction, was surprised to see three pairs of glimmering eyes. On a nearer approach I was delighted to see a large doe and two beautifully spotted fawns—a picture long and hopefully desired.

The mother deer was feeding on a plant common to those waters, while the fawns romped about with a care-free abandon indicating a dependence upon a milk diet. When we were within 25 yards, the doe became restless under the light and turned up the shore toward the old lumber road; but the fawns, apparently enjoying the il-

luminated shore, ran to and fro in a way to prevent getting the entire group on the small plate.

With great anxiety I awaited the moment when the three would come into closer proximity, and several times was tempted to fire the flash when the doe and one fawn were in a good position.

Just as the doe reached the trail, and when I feared that in the effort to get the three I should permit all to escape, the fawns ran in behind their mother, preparing to follow her clearly intended retreat. I gave a shrill whistle, my finger resting on the trigger of the flashlight ready for instant action.

The fawns turned broadside as the mother stepped ashore and in open-eyed amazement gazed at the round ball of fire, which had hitherto been so silent. Bang! went the powder, and a great tongue of flame flashed out sending a column of white smoke rolling up to the top of the trees.

DOE AND FAWNS REUNITED

Opening my left eye, which I had purposely closed when the blinding flash was fired, I saw the doe running up the trail, while the fawns, temporarily blinded from facing the dazzling flame, jumped about in great confusion. One finally struggled up the shore, colliding with brush and projecting logs as it went, while the other jumped into the water and headed directly for the canoe, dimly seeing a lighted way in front of the jack when all about was impenetrable darkness.

As it passed I seized it gently by its slender neck, whereupon John, who had a long standing order for a young deer, asked me to pull it aboard. However, the thought of a capsized, with the loss of a negative more valuable to me than the prize money in sight for the guide, and the reluctance, also, to separate forever those frolicsome twins, led me to turn the swimmer ashore. When we returned an hour later, the absence of bleating cries indicated that the family was reunited, but doubtless still in a state of wonder at a whistling moon that had acted in such an unexpected and terrifying manner. (See frontispiece of this volume.)

The white-tailed deer, unlike moose and elk, after it has once been shot at with a gun or flashlight, will rarely face a jacklight at close range; for it associates the explosion in either case with the lantern,

and when this light is once more seen approaching across the dark waters or coming through the woods, it bounds off snorting, or quietly skulks away before the hunter gets within range.

FLASHLIGHTS TEACH DEER WARINESS

This form of night photography, therefore, in addition to being a bloodless sport, has doubtless saved the lives of many deer that otherwise would have fallen before the deadly guns of headlight hunters. On several occasions I heard such hunters complain about the difficulty of getting within gunshot of deer in the neighborhood of Whitefish Lake at night. The reason was never explained to them.

A night picture of a fine buck taken on Whitefish Lake in the early nineties seems worthy of record, for it was obtained under unusual conditions. With John paddling, we entered the lake an hour after it should have been dark, but an exceptional display of northern lights gave an illumination equal to that of a full moon, and still more extraordinary were the flashes of lightning in a large white cloud overhead. This lightning was almost continuous and confined wholly to the cloud.

What astounded me still more was the lack of thunder, for I had always supposed that every flash of lightning created a vacuum with resultant sound. This may possibly have been a part of the auroral display. Heat lightning I had assumed came from thunder storms so far distant that the sound was inaudible. Under such light conditions a flashlight photograph of a wild animal was impossible.

The night being warm and quiet, we sat in the canoe viewing this dual manifestation of nature. In an hour the luminous cloud passed to the north, and the auroral display ended about the same time. Thereupon we entered the slough.

TAKING THE FAMOUS PICTURE, "HARK"

A long distance ahead appeared the glowing eyes of a deer. The width between its eyes convinced me that it was a large buck. When we were within 150 feet, the gray body and a fine pair of antlers began to take form. Becoming nervous under the approaching rays of light, the animal began moving toward shore.

With the aid of the bow paddle we forced the canoe through shallow water filled with a mass of water plants. As the



ALERT!

A big buck in the velvet was taken by flashlight from the canoe. A timber wolf on a nearby hillside had howled a moment before, thus accounting for the buck's attitude. This picture was number 5 of the famous "Midnight Series" that won highest awards at both Paris (1900) and St. Louis (1904).



A MIDNIGHT REFLECTION

A feeding doe, after watching the jacklight on the approaching canoe for a short time, lowered its head to resume its occupation as the flash was fired. This picture was number 3 of the famous "Midnight Series" that won highest awards at both Paris and St. Louis.



A BIG SURPRISE FOR A LITTLE BUCK

It fed unsuspectingly toward the approaching canoe, its head and body partly concealed by the reeds. When it came to the edge of the open water, it was amazed to see the glowing jacklight less than 12 feet away. It was still more startled when the flashlight exploded almost in its face. This picture, originally titled "Expectation," was number 4 of the famous "Midnight Series."



MONARCH OF THE NIGHT

This flashlight of a lordly buck was taken one night on the lower Whitefish River, Michigan. It was number 9 of the famous "Midnight Series" that won highest awards at both Paris and St. Louis. Though the deer is slightly out of focus, the photographic defect is compensated for by an artistic softness lacking in more brilliant negatives.



DEER AND PORCUPINE—AN UNEXPECTED PORTRAIT

The photograph of this deer was taken just as it was reaching out to take the scent of its prickly neighbor. The author did not notice the presence of the latter until the flash was fired. Such chance encounters of wild animals are rarely recorded. The picture was number 8 of the famous "Midnight Series" that received highest awards at both Paris and St. Louis.



SUSPICION

With its ears turned in two directions to catch the lightest sound of danger, and its tail drawn close to its body, this doe was timidly watching the approaching jacklight. This picture, published under the title "Startled," was number 6 of the famous "Midnight Series" that won highest awards at both Paris and St. Louis.



HAS HE GUN, OR CAMERA?

This large white-tailed buck in the velvet was caught by the flashlight as he stopped on the bank above to gaze at the jacklight in the bow of the canoe. It was necessary to raise the camera quickly as the flash was fired, in order to get the image on the plate. The picture was number 7 of the famous "Midnight Series."



MIDNIGHT WADER IN RETREAT

With the explosion of the flashlight the little buck shown on page 31 turned and started away through the water. It was again recorded by a second flashlight. In this view the long, fluffy white tail which gives the species its name shows to good advantage. This picture was number 10 of the famous "Midnight Series" that won highest awards at both Paris and St. Louis.

deer advanced, he became alarmed at the fluttering rays of light reflected from the alders ahead of him, and stopped. This gave us an opportunity to come within the proper distance. I stuck my paddle in the mud and raised the flashlight apparatus overhead.

Although intent on getting the picture, I was at the same time impressed with the beauty of the scene. Between the canoe and the animal were hundreds of little white flowers, and in the circle of light stood the big stag, quartering and looking away. The black background obscured the distant alders and made more distinct and impressive this monarch of the forest.

Pressure on the trigger brought a great flash intermingled with a boom that filled the suspicious animal with terror. Alarmed by the explosive bright reflection on the alders before him, the buck whirled about and struggled through the mud by the canoe. As he passed he detected our presence, and, again turning, made for the shore, where he was swallowed in the darkness.

The picture thus taken became well known years ago through its reproduction as a supplement entitled "Hark" in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1906. (See frontispiece of Volume II.)

In the week following the taking of the picture of the big buck just described, I had an encounter in the same locality with a much smaller one, which lacked the sagacity and wariness of the first.

BIG SURPRISE FOR A LITTLE BUCK

No deer were seen or heard when we entered the slough, but later the jacklight showed the glittering eyes of one behind the reeds. There it fed and moved about without approaching the edge of the water. Finally it moved toward the inlet where the shallow water was scarcely sufficient for the canoe.

We pushed over the sandy bottom with both paddles and brought the boat to a point within 25 feet of where we thought the deer would cross the stream. Instead of doing this, however, it came directly toward us, with its head down, browsing most of the time, so that the reeds concealed it.

If it continued to move in this direction, it would come into view only about 10 feet

away. I therefore set the focus of the camera for that distance.

On reaching the fringe of reeds, with head up, it looked directly at the jacklight only a few yards away (see page 47). The flashlight exploded almost in the face of this unsuspecting animal and the creature began staggering about in a blind effort to reach the shore. With a noose it could easily have been captured.

Reloading the flashlight and changing the plates, we took another photograph as the animal waded through the shallow water beyond the reeds. This picture showed the deer retreating, its long white tail, for which its species is named, appearing to exceptional advantage (see p. 52).

Another prized flashlight picture that required considerable patience to get is that of a doe. The animal was first seen feeding in a marsh well back from the water and beyond the range of a night picture.

Pushing the boat as close as possible, we waited for nearly an hour before the deer came within proper distance. As it stood broadside, head down, with tussocks of grass about it, I could see its reflection in the water. Usually the reflection of an animal at the water's edge is distorted by slight ripples from the approaching boat, but in this instance the canoe was stationary, and thus we obtained a double picture of this quiet midnight scene (see page 46).

One dark, warm night in July, 1893, the canoe quietly entered the slough. As a somewhat experienced camera hunter, I was certain that many deer would be seen under such favorable conditions. We found a doe feeding under a bank. She seemed to be wholly indifferent to the jacklight, and we had no difficulty in approaching close enough for a picture.

Just as the flash was about to be fired, there came the clear and mournful howl of a timber wolf on the opposite bank. The deer's whole attitude changed instantly, and it slunk quietly away, head down and tail pressed close to its body, the picture of terror. Knowing that it would be useless to remain longer while the most dreaded enemy of the deer was about, we turned the canoe toward the lake.

While we were passing close to a high bank, a deer jumped up and began walking parallel to us, but its form could not be seen. It was possibly a buck that had been lying in concealment close to the water in



A MIDNIGHT DRAUGHT AT THE EDGE OF A SAND BAR

As the flashlight flared, the camera caught not only the deer but its reflection in the water, an effect particularly pleasing to the photographer.

case a wolf should find its trail. It seemed likely that the deer would come into sight at a small opening ahead.

We turned the boat that way, and found it necessary to tip the camera up at an angle high enough to cover the spot where the deer might appear. In a moment a very large buck stood in the opening, gazing down on the water and perhaps wondering whether the canoe contained a gun or a camera.

Just below the deer were the remains of a great white pine stripped of its bark and most of its limbs during the many years it had lain there. After the boom and the dazzling flash, the buck dashed away uncertain as to the kind of firearm that made such a noise (see page 51).

TWIN FAWNS ADOPT A MOTHER

The time came when I had taken a sufficient number of night pictures of deer from a canoe in northern Michigan. Having invented meanwhile a method whereby deer and other animals could take their own pictures, I gave up visiting Whitefish Lake at night, going there only in the daytime

to see whether the automatic flashlights at set cameras had been fired.

After many years, however, the desire again came to prepare the canoe and once more try the hand flashlight on a deer or any other animal that might appear.

As I entered the slough one night, I saw a large doe with two very small spotted fawns trailing behind coming down a runway to a broad sand beach flanked by reeds. As the jacklight drew nearer, the doe gave a shrill snort and retreated the way it had come, leaving the two little ones gazing in our direction, evidently so blinded by the lantern that they did not know of their mother's departure.

They soon discovered her absence, and each little waif began uttering a low whimpering sound such as I had never heard before. Being too far away for a picture, we awaited developments. Soon a smaller doe approached from the opposite side. The fawns immediately joined her. Wherever she wandered, they were at her heels.

After we had waited a long time and found that we could not get closer, we fired the flashlight while the three were at a considerable distance (page 59). The doe gave



WARINESS TREADS LIGHTLY ON THE SHORE OF WHITEFISH LAKE

This doe was suspicious of the approaching jacklight and stood in an alert attitude, poised for flight, just as the flashlight caught her.

a long jump and disappeared into the reeds, the fawns again being left alone.

The wake of light made by the lantern now invited their approach, and John, leaning forward, whispered, "I think I can catch one of the fawns if you keep them covered with the light."

Recalling the time when another picture of a doe and twin fawns had been taken and, fearing to upset the canoe, I had refused to capture the fawn that swam by, I now assented to John's suggestion, though doubtful of his success.

JOHN WRESTLES WITH A FAWN

Getting out of the boat cautiously, he made a circle in the darkness and came in behind the fawns. When near enough, he jumped and landed on the flank of one. Down they went together. I should have taken a flashlight of this amusing scene, but the loud bleating of the little prisoner and John's efforts to bind its four feet with his belt were too diverting.

After the struggle had continued for several minutes, the would-be captor gave up and returned to the boat with a bloody nose and a torn shirt as evidence of the encoun-

ter. Both fawns then took to their heels and were doubtless soon found by their anxious but timid mother.

From my diary of July 20, 1898, I quote: "Entered the lake at 9 p. m. and heard a porcupine crooning on the opposite side. Found it was a mother with her black-haired young one feeding on mosslike water plants. These were lifted from the water with the claws of one paw, and eaten with evident relish. The group appeared worth photographing; so the flash was fired.

"Continued down the shore to a large, partly submerged, hollow log, always occupied during summer and winter by muskrats. In the afternoon we had placed some carrots on the log and they had been eaten. Two pudgy muskrats, sitting side by side where the carrots had been, accounted for this. Fired the flash and both animals fell into the water, one giving a ratlike squeak of disapproval.

A MIXED BAG

"From there paddled to Bear Bay, where the shallow water was a favorite place for deer. Saw a doe a short distance ahead but it went ashore and continued running in



THIS DOE AT HOWE'S LAKE RESENTED INTRUSION

As she was coming down to the water, she saw the jacklight on the canoe and stopped short, pawing the ground with one foot and uttering a series of short, whistling snorts.

front of the canoe. Evidently it had its picture taken before and did not care for another. Turning the light away toward the water, we managed to get close enough, as it fed, head down, in the other direction.

"Fired the flash, and an instant later a gray-colored bird darted from a limb nearly overhead, almost hitting the bow of the canoe. The negative, developed the next day, showed a perching kingfisher, partly surrounded by leaves, watching the approaching light (see page 63).

"Then entered the slough where frogs were croaking and numerous fireflies gliding about in the reeds. Suddenly overhead a blue heron flapped from the top of a dead cedar, uttering harsh notes of alarm. A deer a short distance away went off with a rush, for this animal is quick to interpret the warning notes of a bird or beast.

"Waited at the inlet, and in a few minutes a mallard duck with her half-grown family passed in front of the canoe and the flashlight recorded them (see page 111).

"On our return a blue heron, probably the same one we had disturbed, was seen standing on a log. This time it was caught apparently asleep, an unusual thing in the

case of such a wary bird (see page 119).

"Its picture used my last flashlight cartridges and we returned to camp, passing a large buck on the way down the river. This I was sorry to miss."

Between 1892 and 1900, when the real and lasting merits of the camera as a part of the sportsman's equipment became more and more apparent to me, I wrote articles in advocacy of the new pastime of hunting with a camera. I expressed a strong reaction against useless destruction, and voiced confidence in the camera as the sportsman's best friend.*

PHILOSOPHY FROM THE PAST

In the NATIONAL GEOGRAPHIC MAGAZINE for July, 1906, I assembled some of these observations, with additions, amply illustrated. After the appearance of this article, I was much gratified to receive an appreciative letter concerning it from that versatile statesman, sportsman, and conservationist, the then President Theodore Roosevelt (see page xviii).

* See "Hunting With a Camera," *New York Sun*, August 25, 1895. "A Harmless Sport—Hunting with the Camera," *New York Independent*, June 7, 1900.



NIGHT VISITORS COME TO THE SLOUGH

Both the two-year-old buck and the doe in the background are looking back along their trail for possible danger, apparently indifferent to the light from the water side.

In view of its historic interest and as a picture of my mental attitude on the subject, which has changed little during the passing years, the text of my GEOGRAPHIC MAGAZINE contribution is quoted below:

THE AUTHOR'S HUNTING CREED

"Looking back to that period, many years ago, when the finger eagerly pulled the trigger and the eye anxiously sought to pierce the momentary veil of smoke between the gun and its intended victim, and then to that later period, when the simple pressing of a button captured, for all time, the graceful image of the hunted quarry, one becomes conscious of a peculiar mental evolution.

"Success in the hunting field should properly be dominated by a keen sense of pleasure which, if absent or but a minor incident in the chase, indicates a misdirected effort. We all know, today, that the average successful and contented sportsman will admit that the mere taking of animal life is regarded as an apparently unavoidable incident in the gratification of desires existing wholly apart from the shedding of blood.

"One purpose of this article is to show that the time has come when it is not neces-

sary to convert the wilderness into an untenanted and silent waste in order to enjoy the sport of successfully hunting wild birds and animals. So many advocates of hunting with the camera have been heard of late, that my voice need no longer be raised in behalf of this sensible and attractive pastime, were it not that many such writers, coming from the ranks of ultra sentimentalists decry the sportsmen as a set of ruthless butchers, blind alike to the beauty of wild life and to the ethics of ordinary decency.

NO CENSURE FOR THE SPORTSMAN

"No greater error could exist or its effects be more unfortunate. Sportsmen, the world over, constitute a high order of citizenship; generous, self-reliant, and faithful; they have done much in keeping up the virility of the race, and in leavening those debasing influences of over-civilization.

"The all-inspiring motive of every true sportsman is fair play and a fair chance to the animal or bird whose life may pay the forfeit in the contest. The salmon must be lured from the foam-crested pool with a fragile, artificial fly and landed with a rod



A NIGHT SNAPSHOT CAUGHT A DEER TROTTING

This fine buck passed the bow of the canoe at a speed that would have made a blurred image on the plate, with the slow powder then in use, except that the author swung the camera as closely as possible with the motion of the animal. The blurred images of the grasses show the effect of moving the lens at the moment of exposure.

so light that perhaps an hour may pass before the handnet is used; game birds are to be taken only on the wing, does and fawns must be given continuous protection; the game bag has an ever lowering limit; the shooting season becomes but a small fraction of the year and the victims of the gun must not be converted into cash.

FAIR PLAY IN THE FOREST

"Where else in the ranks of civilized man do such rules prevail? In business competition, in the race for social and public honors in all those contests wherein Mammon, or Ambition, holds the tiller and guides man on to victory or defeat how often is the square deal the guiding light?

"Does any one believe that if Theodore Roosevelt after his graduation from æsthetic Harvard, had spent his life within the narrow sphere of his birth that his career would have been the same? Or that if he had merely lived on a Dakota ranch, with his hand on the branding iron and his mind upon the cash value of each season's round-up, his nature would have been the same?

"Self-reliance, quickness of purpose and of action, and a broad view of man as Nature's noblest creation seldom comes to one who forms but an insignificant atom in a conventional assembly of mankind.

"While, therefore, it becomes my part to point out an additional and perhaps wholly superior method of enjoyment for the wilderness hunter, I can but protest against any crusade which by maligning the sportsman may prejudice him against the camera, or, what is even worse, lead him to give up his yearly visits to Nature's realms, wherein lies the inspiration for a better and stronger life within the city's walls.

"Many years had elapsed before the advent of the hand camera made game photography at all practicable, but within two seasons, after my experiments with it, the full possibilities began to be most apparent. It may, therefore, be of interest in this connection to reprint extracts from one of the first articles ever published advocating the use of the camera in the field of sportsmanship:



TWIN FAWNS FIND A STEPMOTHER

As the jacklight approached a doe and her pair of fawns, the mother quietly withdrew, leaving her offspring staring at the light. On finding themselves deserted they fell in behind another doe. When the flash was fired, the fawns were again deserted. The author's companion tried to capture one of the waifs and met with a severe rebuff (see text, page 54).

"A sportsman's life consists largely of three elements—anticipation, realization, and reminiscence. We look forward to the trip by rail, by canoe, and then perhaps a tramp on foot into the heart of the wilderness.

"Then come the camp and its pleasant environments, and that lucky, radiant day when the early morning sun casts a glint upon the branching antlers of a mighty moose, as, half concealed in the thicket, he furtively and slowly browses his way along. The breathless wait until the neck or shoulder become exposed, the shot, and then—success—that is, sudden death; or perhaps success intensified by a hasty scramble after the mortally wounded beast on a trail, at the end of which we triumphantly find our victim dead or dying.

GAME TO RIFLE, GAME TO CAMERA

"Would that we could realize that what is game to the rifle is game to the camera!

"Every true sportsman will admit that the instant his noble quarry lies prone upon the earth, with the glaze of death upon the once lustrous eye, the graceful limbs stiff

and rigid, and the tiny hole emitting the crimson thread of life, there comes the half-defined feeling of repentance and sorrow.

"The great desideratum, after all, consists of neither meat, nor antlers, nor hide, for the very next day we may be at it again, if able to do so without too severe a tax on our conscience. Therefore we reach the conclusion that much of our large game, when skillfully hunted and dispatched by the modern sportsman of decent instincts, owes its extinction to a variety of motives animating the hunter.

"Surely we do not travel a thousand miles, indifferent to time, labor, and expense, to get a few hundred pounds of wild meat, probably not half so toothsome as the domestic cuts in the market stalls of our own town or village, and costing frequently more than their weight in precious metal. Neither can hide nor antlers compensate us, except as visible evidence of our skill, for the taxidermist is ever ready to supply specimens of more surpassing beauty at half the cost.

"Some time we will come to recognize the fact that the real enjoyment of the out-

ing in the woods or upon the water arises mainly in the freedom from business cares and the artificiality of city life, with the opportunity of indulging in some health-giving, exhilarating recreation, whatever name it goes under. This is especially true of the non-professional hunter of large game.

"We contentedly cast a fly all day into a swirling pool and may hardly get a bite, when a stick of dynamite would have covered the surface with a crate of trout or bass. We hopefully sit for hours shivering on the limb of a mountain oak and may contentedly return empty-handed, when the steel trap, staked pit, or set gun would have done the work equally well.

"Every camera hunter must admit that more immediate and lasting pleasure is afforded in raking a running deer from stem to stern, at twenty yards, with his 5 x 7 bore camera than driving an ounce ball through its heart at 100 yards.

NO CLOSED SEASON ON A CAMERA

"Then think of the unlimited freedom of this noiseless weapon. No closed season, no restriction in numbers or methods of transportation, no posted land, no professional etiquette in the manner of taking your game; but you can pull on a swimming deer or an elk floundering in the snow, take a crack at a spotted fawn, bag the bird on its nest, or string your cameras out like traps with a thread across the runway and gather in the exposed game-laden plates at nightfall without any scruples about being called a pot hunter or a game hog.

"While it is true that whatever is game to the gun is game to the camera, it must be particularly noted that the latter's field is much enlarged by the immense variety of birds, animals, and reptiles which are never considered fair prey for the huntsman.

"Game in the early days was declared to be only such as was edible, and this standard exists at present, though certain predatory animals and those possessing handsome pelts have at times been pursued by sportsmen in the vain effort to broaden the ever-narrowing sphere of their activity.

"Non-game birds and animals outnumber the edible class a thousand times, and it is this great advantage which makes and will continue to make camera hunting the more attractive and permanent of the two methods of pursuing wild life, and which

will at the same time largely counterbalance the greater difficulty of photographing birds or animals that could be shot with ease under similar circumstances.

VARIETY SPICES CAMERA HUNTING

"The difference between stalking within rifle range of a moose, a deer, or a bear and getting within a few yards of it in broad daylight with the camera need not be pointed out. The restrictions to game which prevent the sportsman's hunting the golden eagle, the snowy owl, the gorgeous flamingo, the gulls, the herons, and those hundreds upon hundreds of other birds, varying from the tiny humming bird to the mighty condor, do not apply to the man with the camera.

"The porcupine, the wild cat, the raccoon, the wolf, the alligator, or the sea-lion may be to him the fairest and most attractive kind of game, because they require the same skill and the same patience which leads the sportsman to pursue to the death those varieties of animals which custom allows them to kill for sport, under the belief that their edible qualities is a justification.

"It is only within the last few years that compact photographic appliances, quick shutters, rapid dry plates and films have made possible successful work on large game. Otherwise some of us might have reformed before.

"The longer we have hunted and the greater our success, the less able are we in after years to recall many hunting scenes with satisfactory distinctness. We have taken so many mental photographs that our gray film fails to be clearly and permanently impressed with all that the eye has successfully focused.

"Not so with the camera hunter. Each year adds value to his successful shots; and when he departs for the happy hunting grounds, his works live on forever.

"Generally speaking, it is a patent fact that in the more remote portions of our country the largest of the great game fall singly and in bands without any pretense that the meat itself can be used. This is especially true of the moose, elk, and caribou, and formerly of the buffalo. In many instances the antlers and hide become a handsome trophy, but at a cost far exceeding their commercial value. Wherefore this anomalous state of affairs?

"If the incentive to pull the trigger is the flesh pot or the purse, the case is in-

curable. To the professional hunter the camera would be a hollow mockery, and a plate containing the image of a deer instead of a solid chunk of venison a Barmecidal feast. To the professional, killing game is purely a matter of business, like cutting cordwood, and therefore gauged upon a different principle than the one which governs most of us in hunting.

"So the days pass on and the nights, with all the scents of the woods and the thousand charms of nature and of wild life; all the zest of pursuit, all the setting of the wit of man against the wit of wild beast, all the preparation for the chase, and all the cunning of pursuit, to be rewarded with tangible evidences of human skill and patience which will long outlast the details of the scene as caught by the most powerful memory."

The illustrations used in my GEOGRAPHIC MAGAZINE articles indicated the broad field open to camera hunting. The bag has been a varied one ranging from the gigantic bull moose to the bull frog, the graceful deer to the tiny deer mouse, the sleeping bird upon the nest to the rapid flight of wild fowl speeding before the blind.

TAKING FLASHLIGHTS FROM A CANOE

My pictures show that all is game to the camera, irrespective of edibility; that you can still-hunt your game or shoot it on the wing; set your camera out like traps; hunt any season of the year, in daylight or in darkness; have admission to lands closed to the man with the gun; and never be limited by law or custom in the size of your game bag.



THOUGH TAKEN UNAWARE, THE LADY IS UNCONCERNED

A close-up flashlight caught this large doe standing in the border of a small lake. The facial expression of the animal is unusually well portrayed.

Some animals are easily approached in a canoe, or flat-bottomed hunting skiff, with a jacklight in the bow. When the craft is within about 25 feet, the flashlight is fired and the picture taken.

For this purpose the boat used by the author was equipped with a heavy board table, about 15 by 20 inches across, mounted on the bow, upon which was placed the camera. The table had a round socket in the middle of the underside, into which was inserted the top of a round supporting stick about two inches in diameter that passed down through a round hole in a board fixed across the bow, and rested in a socket on the bottom of the boat. This upright was greased at all points of

contact and served as a center upon which the table revolved noiselessly.

By the use of such a table holding one or two cameras, with a jacklight attached to the top of the open, boxlike frame, the light and cameras can be turned quickly to follow the movements of an animal without changing the course of the boat. The photograph on page 41 gives an excellent illustration of this equipment, with the writer in position to fire the flashlight.

A rough-and-ready support for the cameras can be made by fastening a board on top of the bow of the canoe and attaching on top of it another board of the same size by driving a large wire nail through the middle. With some ham or bacon rind placed between the boards for lubrication, this makes an effective table in an emergency.

Whatever may have been my particular contribution toward wild-life photography in the daytime, it was of a non-essential character, so far as the immediate future was concerned, for the method would soon have developed naturally on the coming of proper apparatus.

PRAISE FOR OTHERS

A year or two after my first attempts, Wallahan, of Colorado, on his own initiative and with an ordinary tripod camera, succeeded in getting a remarkably beautiful series of photographs of the mule deer on its descent from the mountains each fall, and later, with better equipment, photographed many other animals in his State. Then Chapman, our leading ornithologist, began photographing birds, and was followed by Kearton, of England, who soon became the foremost bird photographer across the seas.

Finally, many years later, Schilling of Germany, and Nesbit and Dugmore, of this country, became interested, two of them obtaining remarkable night pictures on their African expeditions. Since then has come a host of others, whose fine and ever-increasing collections indicate the success and permanency of this method of photography, both as a sportsman's pastime and for the scientist desirous of recording wild life in its natural surroundings.

Because of his accurate knowledge of wild life, and under the prestige and authority of his high office, President Roosevelt did more to conserve permanently the wild animals and birds of this country than any other

man. By setting aside, under executive order, many bird and game refuges on the public domain, including islands on the Great Lakes and on both coasts, and even in the distant waters of Hawaii, he established a precedent that has led to remarkable results and will save many a rare wild creature now verging on extinction.

CHANGING VIEWS OF A SPORTSMAN

Once a pioneer, who collected toll from the game in a fair way from the hills and plains near his western ranch, in later years he confined his hunting to participating in lively chases after the wolf, the bear, the lynx, and the cougar, whose destructiveness has put them in the "predatory" class, or to securing specimens for scientific research.

While in the White House he wrote, in the introduction to a book on wild life illustrated by the camera, only then coming into use for this purpose:

"I desire to express my sense of the good which comes from such books, and from the substitution of the camera for the gun. The older I grow, the less I care to shoot anything but 'varmints.' . . . If we can only get the camera in place of the gun and have the sportsman sunk somewhat in the naturalist and the lover of wild things, the next generation will see an immense change for the better in the life of our woods and waters."

And this is the man, who for many years, ardent sportsman as he was, became the leader in the preservation of wild life and in the advocacy of the means for best studying and enjoying it.

Although I was an eager hunter from early youth, and pursued in the most relentless way those varieties of birds and animals whose cunning and whose conquest made them worthy of the name of "game," it must not be assumed that, with the zeal of a convert, I now indiscriminately decry the man with the gun.

In earlier days the explorer, frontiersman, homesteader, and trapper were justified in making such use of wild life as their urgent needs demanded. This meant the rational use of the lower animals for man's requirements. In the more civilized regions this use is now regulated by law in order that the selfishness of individuals shall not completely destroy wild things that have high æsthetic, as well as great economic, value that may be capitalized.



NOCTURNAL ACTIVITY OF A DEER DOES NOT DISTURB A BIRD'S SLUMBER

By a rare chance this doe was drinking under the branches of a tree in which was perched a sleeping kingfisher (upper right corner). It was not until the negative had been developed and the print made that the author discovered his avian subject (see text, page 56).

With the advancing subjection to man of the territory of the United States through the multiplication of farms, flocks, and herds, and through other economic changes, game both great and small becomes increasingly endangered. In recognition of this, the market hunter has been outlawed as working against the public interest, for it seems evident that game can be maintained only in numbers that may be taken in a limited way for the personal use of individuals.

Under natural conditions in the wilderness, and under the direct protection of man in more settled areas, game produces a surplus, just as would domestic animals under similar circumstances. This surplus must be reduced in one way or another or the food supply of the species will be decreased and its welfare threatened.

NEED NO LONGER INSPIRES HUNTERS

In modern days when fagged civilized man seeks the solitude of the forest or other wild place, he goes impelled neither by the urge for food nor by a barbaric desire to see gaping wounds and the pitiful death struggle of some wild thing, but to enjoy the delightful freedom of the wilderness and to pit his dexterity and resourcefulness against the experience, strategy, and in-

herent cunning of the game he pursues. Every sportsman worthy of the name who now hunts big game, or even smaller quarry, is moved by feelings directly opposed to the infliction of needless suffering and useless slaughter.

SKILL, NOT KILL, THE BEST MOTIVE

It is unfortunate, however, that to many men the peep-sights of a rifle continue to circumscribe their vision. It should become generally recognized that when the camp has been generously supplied with wild meat, the camera offers further means of exercising even greater hunting skill than does the rifle, for skill, and not kill, should be the motive, except in the case of such predacious species as the wolf, the cougar, and the crow.

Therefore, under present-day conditions, I feel that could many sportsmen be induced to use the camera instead of the gun in the hunting field it would tend to lessen the drain on the existing supply of game birds and animals, and at the same time afford an agreeable substitute. It will be noted that game conservation and hunting with the camera are two co-related subjects that have inspired the greater part of the pages in this work.



CHAPTER III

Automatic Photography by Daylight and Flashlight

MY taking daylight photographs of deer by a set camera operated from a place of concealment by a long cord led naturally to the improved method of having a fine cord lead from the camera, at a height of from 12 to 18 inches, to some stationary object so that when an animal passed its leg or breast would touch it and operate the shutter. This first method of procuring automatic daylight photographs of deer and some other animals was highly successful (see pages 28 and 29).

For some years after I began using the hand flashlight to take pictures from a canoe, my attention was limited to members of the deer family along the edge of the water, or to such stolid creatures as the porcupine. There were many animals of nocturnal habits that seldom permitted the approach of the jacklight, or were so active as to prevent the proper focusing of the lens when they were encountered.

The woods surrounding Whitefish Lake, for instance, sheltered such desirable animals to photograph as wolves, foxes, raccoons, rabbits, and skunks; and along the watercourses were minks, otters, beavers, and muskrats. To get night pictures of some of these elusive animals was difficult.

PHOTOGRAPHING ELUSIVE CREATURES

Finally I invented a flashlight that would be discharged when an animal touched a string stretched taut across its way, or pulled on a bait at the end of a string. Meanwhile the shutter of the camera had been left open, and I remained concealed in the neighborhood, ready to return and close it as soon as the flash had been fired. Thus by much waiting, often in the house boat but at times in less comfortable surroundings, I obtained some good pictures.

There were many animals, however, that came to the bait so intermittently that I realized the advantage of having the shutter automatically opened and closed during the flash. I accomplished the desired result by making the exploding flashlight release a taut rubber band that operated the trigger of the shutter.

Instead of using the fastest flashlight powder obtainable, as had been necessary in the former method when the shutter re-

mained open, I used a slower grade and obtained a quicker exposure by setting the shutter at high speed. The first method was termed "powder speed" and the other "shutter speed."

I found it difficult, however, to synchronize the flash with the operation of a rapid shutter, until my guide, John Hammer, conceived the idea of substituting for the rubber band an air pump connected with a rubber tube that would operate the shutter. When slow powder was used, the shutter always operated during the maximum of the illumination. This device, which I have used ever since, in preference even to an electrical apparatus invented later by others, solved the problem and led to more diversified use of the camera.

The camera and accessories can be so arranged that any animal or bird and many a reptile, however large or small, agile or cunning, may have its picture faithfully recorded during daylight or darkness without the immediate presence of the photographer.

The greatest immediate pleasure that comes to the camera hunter is to stalk a big game animal on foot or quietly paddle up to it in a canoe. Taking pictures from the shelter of a well-located blind is also enjoyable. When the photographer cannot be present, several cameras secreted in the forest or along the waterways ready to picture any shy creatures that pass add to the fascination of the work.

In this branch of photography one should have a fair knowledge of the habits and range of the animals sought; for, though there are many, if they can be located, such as the raccoon, opossum, skunk, muskrat, woodchuck, rabbit, and squirrel, that will seize almost any kind of bait, regardless of human scent or the appearance of a poorly concealed camera, others, like the beaver, bear, fox, wolf, and deer, are more wary. To obtain photographs of these, one should follow the cautious methods of the trapper who erects a dead-fall or sets a steel trap.

Toward the close of the day, when the fading of light puts an end to the use of the hand camera, one may expectantly visit the camera traps. If the string across the runway is broken or the bait disturbed, the surroundings should be carefully examined for



THIS WAS PROBABLY THE FIRST STEREOSCOPIC PICTURE OF WILD LIFE (SEE TEXT, PAGE 90)

It is a daylight automatic picture of a group of vultures of two species, the black vulture and the turkey buzzard, the shutter having been sprung by one of the birds pulling on a baited string running to a concealed camera (see text, page 72).



A MYSTERY OF THE WILD IS BROUGHT TO THE LIBRARY TABLE

Ever experimenting with photographic devices, the author took keen pleasure in recording the night life of deer by means of flashlight and stereoscopic camera (see text, page 90).



INGENUITY WAS NEEDED IN PLACING THIS AUTOMATIC FLASHLIGHT DEVICE

Two cameras were set to photograph beavers working at night completing a house built on the bank of a beaver pond about 30 miles from Marquette. The line from the flashlight mechanism extended to the unfinished part of the house where it would be touched by the first beaver coming to work. After this photograph was taken, the waterproof camera boxes were concealed as usual by short leafy boughs.

the hoof-marks of a frightened deer or the scratches made by the claws of some carnivorous animal fleeing at the click of the shutter. If, however, no visitor has come, the flashlight mechanism may be adjusted so that when some night prowler presses against the string or eagerly pulls at the bait the flash will illuminate the surroundings while the plate records the scene.

JOYS OF FLASHLIGHT TRAPPING

Lying beside a blazing camp fire that accentuates the darkness of the night, the sportsman may suddenly see a dazzling column of light on a distant hillside, or above the gloomy valley of some water-course. The deep, dull boom of the exploding powder a few seconds later raises a mental vision of an animal fleeing in needless terror from a bulletless weapon and leaving a record of its visit that will give pleasure to one who means it no harm.

Since, to insure higher speed and the exclusion of moisture, I usually explode mag-

nesium powder in a hermetically sealed box, the report is so loud that I have heard it at a distance of three miles and noticed the flash at much greater distances. It is easy to imagine the surprise and terror of some timid animal at first experience of the dazzling explosion; yet the craving for some particularly choice food will lead many of the shyest to return to the interrupted feast.

In the course of time the blinding light and roar seem to be regarded as a harmless manifestation of nature, like thunder or lightning. It soon becomes possible to obtain interesting night pictures of the animal in many attitudes and actions.

Working with flashlight from a canoe, the photographer depends on his ability to judge short distances accurately and catch the animal in proper focus. It is equally important that automatically taken pictures come within the focus of the set camera.

When bait is placed at a given distance, little trouble arises; but when the animal sought is a deer or a moose coming to



THE AUTHOR STUDIED HIS SUBJECT BY CAREFUL TESTS

This photograph of the effect of a flashlight on Whitefish Lake at a distance of about 100 feet was taken to show the possibilities of getting pictures far removed from the camera.



TRIAL OF ILLUMINATION REDUCES CHANCES OF FAILURE

To determine the proper technic of photography by cameras set in the forest, hand flashlights were fired and data carefully recorded.



PHOTOGRAPH OF A FLASHLIGHT SCENE

In order to show what an automatic flashlight scene looks like, the author placed a camera, facing the flashlight, with the object to be photographed between the camera and the flashlight. The white ball of light to the left is the exploding powder. The raccoon, silhouetted against the light, is seen pulling on the string.

water or to its feeding grounds, the problem becomes more difficult. The intercepting string must be touched at a point where the animal will be in sharp focus.

If animals are traveling on a well-defined runway on which the camera can be focused in advance, a string running to a fixed object on the opposite side will insure a good picture. Natural conditions, such as driftwood, rocks, or mudholes along pond or creek, may force animals to pass a certain place at a fixed distance from the camera; and temporarily erected obstructions will often accomplish the same purpose, provided no human odor is left and the material used is in harmony with the surroundings. In more open places the string can be run along the ground under a forked stick and then raised a foot or two over another forked stick at the spot where the animal is most likely to pass.

Usually I camped near enough to hear the explosion, but sometimes the set was many miles away. When I was absent, the camera might remain unvisited for a week

or more; but, with the shutter opening and closing automatically and the camera well sheltered, the exposed plate was safe until called for. On pages 72 and 75 are pictures of deer taken when I was miles away.

SUN AND FLASHLIGHT EFFECTS DIFFER

In some details night flashlight pictures produce opposite light effects from those taken by day. These are so characteristic that flashlight pictures may usually be distinguished at a glance. In the night pictures the white underparts stand out brilliantly; in those taken by day such areas are darkened by the shadow of the body. Another peculiarity of night pictures is that the surface of water shows dark or black, and reflected images of trees or animals are pale or whitish. In daylight pictures the water is pale and the reflected image dark.

The primer for the beginner in wildlife photography usually comprises nesting birds, friendly chipmunks, lazy and sun-loving woodchucks, and stolid porcupines. Even with these, the novice meets many

difficulties, the overcoming of which opens the door for picturing rarer or more active subjects.

Some who take up hunting with the camera become discouraged by early failures and are unable to see how such an instrument can ever be a satisfactory substitute for the sportsman's gun. Others, with their interest only intensified by difficulties, continue until won over by the attractiveness of a contest in which success costs no life, and an awkwardly handled camera leaves no wounded animal.

THE AUTHOR UNDERSTOOD DEER

Since white-tailed deer had been my favorite quarry with the rifle from youthful days, I knew its habits well when I began photographing it and fully appreciated its resourcefulness in avoiding suspected enemies. No member of the deer family is more difficult to photograph in the daytime, although it is the most abundant and widely distributed member of all its kind in America.

Naturally I was confronted at first with many obstacles, most of which were due to my ignorance of photography. Had I not possessed a good lens and one of the first hand cameras made in this country, it is likely that the pastime would have lost an ardent advocate. Persistence and the trial of many methods, however, finally suggested ways of getting pictures with ease and certainty. Few wild animals, when hunted with care and energy, can escape the gun, trap, or camera.

The whitetail has wonderfully keen ears and nose, but its eyesight, like that of most of its relatives, is not particularly discriminating. The slightest sound or scent will attract its instant attention, and then it is useless to try for a picture, although the animal may be within fair range for a rifle.

Perhaps the most interesting of my experiments with a set camera were those conducted in obtaining a series of pictures of the same deer. Conditions favored the trial; for an old doe was in the habit of coming nearly every night to feed upon a succulent water plant growing on a stream not far above camp. She rarely appeared before dark and would not stand for the jacklight.

I began operations by clearing a place among the alders and placing there some cabbage leaves and turnips well sprinkled with salt. It was not long before they dis-

appeared, and clear-cut hoof tracks in the mud made plain the cause.

I promptly placed on a log an empty, well-weathered box, with a hinged lid and a round hole cut in one side for the lens. This I left untouched until the deer fed near it without suspicion. Finally I adjusted the camera in the box, stretched a string from the flashlight across the feeding place, and dashed water wherever any trace of scent was likely to be.

From my bedroom window that night I saw a flash. A good picture resulted, and I reset the camera. It remained undisturbed for nearly ten days, but at length recorded a second picture of the same deer. For some time I made no attempt at another picture, merely keeping the place well baited until from a canoe I could see fresh tracks in the mud. I then set the camera once more and obtained the third photograph.

After that it was impossible by the same means to get the doe to spring the flashlight; for, although unquestionably the black silk thread was invisible at night, she had learned to expect its slightest touch on her upper leg and retreat the instant she felt it. The abundance of porcupines and rabbits made it impracticable to place the thread closer to the ground.

To meet this difficulty, I placed in focus a freshly cut bush with the string attached, and the leaves saturated with salt water. The deer pushed eagerly into the attractive bait, and unwittingly recorded her own fourth "sitting" while nibbling the leaves (see page 77).

THE FAWN SPRANG THE FLASH

After the doe had photographed herself alone seven times in 60 days, she brought her half-grown fawn with her one night. The fawn innocently walked into the flashlight string just as its mother came into view (see page 78).

In an instinctive effort to escape the sharp pressure of the thread, the fawn drew its right foreleg quickly against its body. The doe, walking into the thread in a mass of loose branches ten days later, threw up her leg in the same way, while the fawn, with all the appearance of knowing that there was likely to be trouble in that locality, gazed at her expectantly (see page 79).

One of the best methods of photographing birds singly or in flocks is by use of the set camera. Some years ago I tried to get a group picture of comparatively tame buz-



A WHITE-TAILED BUCK AND DOE PHOTOGRAPH THEMSELVES

The flashlight camera was set on a large white pine log with the thread extended across to a tree opposite. Apparently the doe fired the flash.

zards of two species that daily circled high over my Florida cottage. Even when I was in a well-concealed retreat, these keen-eyed birds detected my presence and would not alight in the vicinity of the bait. After waiting for an hour, I set a smaller camera covered with palmetto leaves within ten feet of the bait, tied a piece of meat to a string, and withdrew.

Returning in half an hour, I found that the bait was gone and the string was in a hopeless tangle. When the negative was developed, it showed a group of birds, including both the black vulture and the turkey buzzard.

Almost any bird of prey, such as a hawk, owl, eagle, or buzzard, will pull energetically on a baited string and thus photograph itself. In the case of smaller or more timid

birds it is advisable to use an auxiliary spring trigger. A common mouse trap set and properly connected will serve for this purpose, for the release of its wire spring, to which the baited string may be attached, requires only a slight pressure.

Pictures of birds nesting on sea beaches, in open marshes, or on the tundra, where the use of a blind is difficult, may be obtained by concealing the camera among rocks, or under plants usually available near at hand. A thread stretched taut across the nest will release the shutter when the brooding bird re-enters. It is usually best to make the screen for the camera a day in advance to avoid imperiling the fertility of the eggs or the life of very young birds, to which long exposure to strong sunlight or chilling wind is fatal.

In this way I procured a series of shore-bird pictures on the eastern shore of Virginia that otherwise would have been unobtainable.

Having scattered grain for several seasons in an orange grove in Florida to attract local birds more regularly, I took a few of their pictures with the automatic camera, the focal plane shutter being set at one four-hundredth of a second. For baiting quail and ground doves I used grains of wheat and sunflower seed strung on a thread connected with the camera.

When some gray squirrels discovered this feeding place, I substituted corn and nuts, the loose end of the baited string being passed through an eye-screw fastened close to the ground so that the squirrel would pull it and operate the camera as it sat up in its graceful and characteristic pose.

WILD ANIMALS NEAR COUNTRY HOMES

Few persons are aware of the abundance of night-loving animals in the vicinity of country homes located near a dense thicket, a swamp, or a rocky ravine. In such places may be found a burrow, a cleft in the rocks, or a hollow tree affording safe refuge to many an animal that seldom makes its presence known to the throng passing daily. There, hidden till nightfall, may be raccoons, opossums, skunks, weasels, or rabbits.

Every winter for several years I set out a camera and flashlight in the town of Ormond Beach, Florida, within 200 yards of several cottages and a winter hotel harboring a thousand guests and employees. Nearly every night brilliant light flashed between an orange grove and a dense thicket, with an explosion audible to all awake.

The morning after, I would be greeted with, "Well, what did you get last night?"

The negatives taken in 33 nights of 1913 showed 12 skunks, 9 of which were of different markings; 4 raccoons, 3 opossums, 1 house cat, 1 pointer dog, 2 swamp rabbits, and 4 wood rats. Yet rarely did visitors or residents encounter any of these animals, and only the roar of the exploding flashlight and the accumulating pictures carried conviction.

Many of these animals are shown in Volume II. The year before the result was the same, except for a greater preponderance of raccoons and a picture of a land turtle.

While this chapter deals primarily with mammals, it may be noted that photographs of alligators, crocodiles, snakes, and turtles

may be taken in the daytime and sometimes at night with the set camera. A string, baited or unbaited, across the basking places or other spots frequented by such reptiles will insure a daylight picture, when the sun is high and the shutter set at its fastest speed; and at night, when the alligators and crocodiles roam the murky waters, a piece of bloody meat or fresh fish will attract them to a bank or sand bar.

There is a land turtle in Florida, formerly abundant, and known locally as the "gopher," that lives in a burrow and seldom appears during the day. Once I found a hole made by one of these within a few feet of the place where bait had been placed for raccoons. This turtle often hibernates during the winter months when fresh vegetation is scarce.

It was not until the middle of March that tracks in the soft sand at the entrance of the burrow showed that the occupant was once more going abroad. I placed a thread across the opening, and on the following night heard the explosion of the flashlight. The picture on page 199, Volume II, shows the clumsy animal coming out.

The flash sent it back down its deep hole for another week. Then it recorded a second picture, and again retreated, this time remaining hidden for so long that I removed the camera. Flashlight portraiture evidently did not meet with the approval of this turtle.

UNBIDDEN GUESTS FIRE THE FLASH

Just as the fisherman in some places is troubled by a shark's taking the hook intended for an edible fish, or the trapper by a wolverine's pilfering his bait, so the set camera hunter often finds his string broken or his bait taken by some unwelcome visitor.

Cameras placed where cattle, sheep, and hogs range will be sprung by these wandering animals. One night a notoriously ill-natured bull belonging to a Finnish settler swished his tail unconcernedly against the flashlight cartridge and got a dose of flame and fumes that made his protesting bellows audible far away.

On a trip up the Tamesi River, in eastern Mexico, I tried for a week to get pictures of the ocelot and the jaguar, but early every night the flashlight was fired by opossums, and it mattered not how high the bait was hung or its variation in kind. On St. Vincent Island, off the Gulf coast of Florida, instead of pictures of raccoons, I obtained likenesses of razorback hogs. A big tomcat,



WHITE-TAILED DEER HAVE A DELICATE SENSE OF TOUCH IN THE FRONT LEGS

The right foreleg of this deer is thrown back against the body in instant reaction to the touch of the thread across its path that set off the flashlight. An ordinary small black silk thread was used for the purpose (see text, page 71).



DOE AND FAWN FIND A FEAST

While the mother eats the cabbage leaf bait, the daughter wanders about exploring its new world.



BUCK AND DOE, TWINS OF THE PRECEDING YEAR, FIND THE BLOCK OF ROCK SALT

This lure with a thread leading to the concealed flashlight camera was the source of some good pictures, but too often porcupines came first.

seeking a bunny for his supper on a rabbit runway, fired the flash one night on the mainland. In the course of two trips after wildcats in a southern swamp, I was baffled by hogs which took the bait in the daytime and skunks which took it at night.

Stray hounds hunting for pleasure and sledge dogs of the North, foraging for themselves in summer, will eagerly follow up wind to the spot where the scented bait lies in front of the camera. Fortunately, however, these marauders seldom return after one bombardment by the flash.

Domestic animals are not the only source of trouble. Once in the wildest section of Newfoundland, when I had set a camera in daytime, with a string across a trail used by migrating caribou in the fall, a French trapper walked into the snare. He felt the pressure of the string on his leg, and hearing

the click of the shutter, jumped back with a yell, thinking his life had been saved only because a set gun, the most diabolical device of the pot-hunter, had missed fire.

A camera and flash which I had set for deer and peccaries on a supposedly unused trail at the edge of a Mexican sugar plantation might have caused an international complication. Two Mexican girls walked into the string when groping their way to a canoe landing and thought they had been fired at from ambush by our party, camping near by. They fled shrieking through a jungle of palmetto and thorns to the nearest cabin, where the additional cries of the children and barking of the dogs made such an uproar that I was quite concerned.

My two estimable companions, Frank M. Chapman and Louis A. Fuertes, declared I ought now to appreciate their feelings every time they approached camp at dusk, "with

such infernal machines secreted anywhere and everywhere."

A few minutes later our host, an American planter, hearing the uproar, came to investigate. When he discovered the cause, he shook me warmly by the hand, expressing a wish that I would set out many more flashlights to scare off Indian and Mexican trespassers. I was relieved by thus having unexpectedly performed a service.

ANIMATED FLASHLIGHT PICTURES

After taking many pictures of deer with the automatic flashlight, I found that usually very little action was indicated in such scenes. Only a slight movement of the front foot or a slow walk provided the pressure on the string sufficient to fire the flash. I often wondered just how an animal would react to the surprise of the flash.

To determine this, and also to add variety to my night pictures, I arranged two flashlight machines with separate cameras. When the first was fired, the resultant picture would show the animal practically stationary; but at the same instant a weight tied to a connecting string three feet long would be dropped automatically, discharging a second flashlight.

The result obtained by the second camera was sometimes extraordinary and always interesting. Some of the deer were caught bounding gracefully away, some bending or twisting their legs curiously in preparation for a leap, and others crouching with their bellies almost touching the ground, as if their legs had well-nigh collapsed at the sudden alarm. These widely differing attitudes evidently give a clue to the varying nervous reactions in the individuals (see pages 85-89).

At times, instead of using a double outfit of cameras, I arranged the pulling string touched by the deer to fire a blank cartridge, simultaneously causing the animal to leap forward, and dropping the weight that exploded the regular flashlight. Thus the camera pictured the departing animal.

Doctor Chapman, who has made a remarkably successful entry into the field of flashlight photography, has been moved to protest against the taking of these second pictures. He writes: "The charm, as well as the value of these pictures, is in their capture of the unsuspecting animal as it prowls the forest on its nightly beat. To yield to our curiosity to see 'what happens' is to destroy this feeling of seeing while unseen and,

at the same time, to take unfair advantage of the animal."

This sympathy for the frightened animal I believe to be mistaken, for I doubt that the second explosion adds much to its consternation.

On the Kaibab Plateau of northern Arizona conditions favored great activity on the part of the feeding animals, and I believe most readers will agree that my pictures of male deer taken there have an additional interest for that reason (see Volume II, Chapter XV). It is of great interest to show wild animals moving about in the peaceful phases of their existence, but it seems to me equally a part of the story to picture them in the attitudes of fear and rage. In a state of nature, all wild life is subject to these emotions. The graceful movements of the whitetail depicted in the accompanying pictures taken by successive exposures certainly carry an appealing charm.

When the deer-hunting season opened early in September, I was usually out of the woods before the first snowfall. During the latter part of September the conditions were most enjoyable, for at that time the fall colors reached full glory, the temperature required no heavy garments, and the long hours of daylight made it possible to stay out until late in the afternoon.

CAMERA TRAPPING IN THE SNOW

Later the opening date of the hunting season was changed to October, and still later to November 10. The purpose of the late season was to afford hunters the means of tracking a wounded deer in the snow or to locate readily the most favorable places to hunt. For 20 years I hunted deer after snowfall and thus learned to read the white pages registering the varying autographs of forest folk from the tiny white-footed mouse to the antlered buck.

In midwinter the wolf, fox, lynx, and snowshoe rabbit are particularly active, and along the open watercourses are the tracks of mink, and often those of beaver seeking to add branches to a scanty store. In a January thaw, red squirrels become alert, and the clumsy porcupine wallows through the deep snow to seek a meal on hemlock needles or on the tender bark of a favorite tree. Skunks or weasels search for mice ensconced beneath the snow.

To the camera hunter in the northern woods, winter can be made quite as success-



THIS DOE TOOK HER OWN PICTURE A DOZEN TIMES

After the third picture at this place it was impossible to get the deer to spring the flashlight; for, although unquestionably the black silk thread was invisible at night, at a slight pressure on the upper front legs the deer retreated immediately. The abundance of porcupines and rabbits prevented placing the thread closer to the ground. To meet this difficulty, the leaves of a freshly cut bush were saturated with salt water, and when the deer rushed into it the pressure of the thread was unnoticed until too late (see text, page 71).

ful as it is to the trapper of furs, whose general methods should be closely followed.

The camera should be placed on a little platform well above the snow and covered with a wooden or tin box or by a paraffined cloth supported by a projecting stick to protect the lens from falling or swirling snow. For pictures of suspicious animals, such as the wolf or fox, the outer box should be covered with packed snow or white cloth to make it resemble a stump in winter.

The flashlight can be fastened to a tall stake or sapling away from the limbs of adjoining trees, from which the wind often dislodges lumps of snow that might prematurely fire the charge. If there is a large tree a few feet back of the camera, the flashlight can be attached to its trunk, where it is less conspicuous. Dark midwinter days or shaded parts of the forest require the use

of the flashlight for pictures taken by day as well as by night.

For a deer, a thread stretched across a runway and connected with the flashlight is sufficient; but, where bait is used, it should be fastened near the base of a large tree with a piece of bark above it to keep off the snow. Some of the scents used by trappers will aid greatly in attracting animals. A succession of snowstorms soon destroys any trace of human scent left by the visiting photographer, so that the most wary animals can be pictured much more easily than in the milder months of the year.

I had no trouble in getting night pictures of deer and snowshoe rabbits, but the brevity of my visits to the forest in midwinter prevented the full development of this method of winter trapping with the camera. It offers tempting possibilities to



A DOE BRINGS HER FAWN TO WATER, WHERE IT LEARNS OF FLASHLIGHT PHOTOGRAPHY

After seven pictures of this deer had been taken in 60 days, she brought with her her large fawn in the gray coat. It walked heedlessly into the flashlight thread just as the doe came into view. Its right foreleg was thrown up to the side of its body at the touch of the thread (see text, page 71).



ANOTHER NIGHT THE MOTHER FIRES THE FLASH AS HER OFFSPRING LOOKS ON WITH INTEREST

Ten days after the picture on the opposite page was taken, the doe walked into the thread concealed among loose branches and threw back her right leg at the touch just as the fawn had done. The photograph shows the fawn in the background looking as if anticipating trouble where it had occurred before.



A WANDERING PORCUPINE IN DAYTIME SPRANG A CAMERA SET FOR DEER

It appears to have moulted most of its long overlying hairs so that the spines are all exposed. These creatures were a "thorn in the flesh" to the photographer eager to record likenesses of other game.



RAZORBACK HOGS WERE UNBIDDEN GUESTS ON ST. VINCENT ISLAND

Just as the fisherman complains of the shark taking the hook intended for an edible fish, so the camera hunter often finds the string broken or the bait taken by some unwelcome visitor. This picture might have been one of raccoons had it not been for the intruders (see text, page 73).



THE CAMERA WAS SET FOR OCELOTS OR JAGUARS

In Mexico and Panama it was difficult to get night pictures of other animals. The abundant black Mexican opossums appeared to think the bait was for their benefit.

those who will make the necessary efforts to get the best results.

In 1906, at the annual dinner given in Washington by the Boone and Crockett Club, President Theodore Roosevelt, the founder of the club, presiding, the German Ambassador was the guest of honor and principal speaker. In the course of his talk he dwelt upon the remarkable feat of Charles Schillings, connected with the Berlin National Museum, in taking the first flashlight pictures of wild animals, then about to be published in a book entitled "Rifle and Flashlight." He said he felt sure that such a gathering of sportsmen would be interested in this publication.

THE GERMAN AMBASSADOR'S MISTAKE

A smile ran about the banquet table. Noticing this, the speaker, somewhat embarrassed, leaned toward the presiding officer and remarked that evidently he had made some blunder.

President Roosevelt replied with a chuckle, "The gentleman sitting opposite us developed this method many years ago and on two occasions has shown his flashlight pictures at our dinners. Moreover, about six years ago Mr. Shiras received the highest award at the Paris Exposition for his flashlight pictures of wild animals."

Later in the evening the Ambassador

apologized for his mistake, and I assured him that he had no occasion to feel disturbed, because it was likely that this method may have been independently developed by his fellow countryman. On the publication of the book I read it with interest to see whether this over-the-sea naturalist had the same difficulties I had experienced in working out a successful process.

Herr Schillings gave an account of devising his apparatus with the assistance of a professor connected with the Berlin Museum. On seeing the latter's name, I recalled having had some

correspondence with him several years before, and in looking over my files found one of his letters stating that he had seen my flashlight pictures of wild animals at the Paris Exposition in 1900, where they had been exhibited by the United States Government.

He had asked to be advised concerning how they were taken, and I had sent him a description and drawing of the apparatus with instructions for its use, expressing the hope that he would be successful in utilizing the information.

President Roosevelt heard of this and, zealous for truth and his country's credit, discussed the matter with the German Ambassador. In the second edition of Schilling's book appeared a paragraph stating that the method of night photography used by him was based on information furnished by an American sportsman who had been successful in taking flashlight pictures of deer and other wild animals.

The incident is an illustration of Colonel Roosevelt's determination that the records should be kept straight. I would never have undertaken diplomatic intervention to procure a correction. Mr. Schilling's night pictures were the finest ever taken of African animal life until Dugmore, Rainey, Martin Johnson, and others followed his footsteps in photographing the wonderful



A NOCTURNAL PROWLER FOILS THE AUTHOR'S PLANS

The house cat is one of the most destructive animals known to birds and small game. The cat pictured here sprang the flashlight set for a raccoon at the mouth of a cave in the forest a mile and a half away from the camp.

fauna of the vast wilderness areas of that continent.

In 1900, soon after the gold medal and diploma had come from Paris, I had been surprised to receive, also, a silver medal and diploma. Since my pictures had been entered in only one division of the Exposition, I assumed that this second award must have been based upon some feature of the exhibit that the jury believed worthy of further recognition.

A LONG-DELAYED DISCOVERY

Thirteen years later came the proper explanation, as indicated in the following letter:

The Cliff Dwellers
220 South Michigan Avenue
Chicago

June 2, 1913.

MR. GEORGE SHIRAS,
MARQUETTE, MICH.

DEAR SIR:

I have had it in mind for several years to write to you to give you a bit of infor-

mation which may be of interest to you. The frequent mention of your name in the reports of the case of Colonel Roosevelt has again brought it to my mind.

In 1900 I was a juror at the Paris Exposition in Class XII (Photography). When we visited the German Pavilion, we were shown some skillfully executed photographs of what purported to be wild animals at liberty. Professor Mitbe, the German juror, made a strong argument in their favor and most of the jury seemed impressed, when Prof. E. Wallou, one of the French jurors, directed attention to the fact that the animals were generally against snow or on rocks against the skyline, and that the edges showed that the prints were made from two negatives.

Later in the day, after our work was over, he and I were walking together and he brought up this incident which he considered characteristically Tudesque. I then told him that if he wished to see some real results of photography of wild animals at liberty, I would show him some by an American, adding that, unfortunately, they were not entered in our section. Then I



BUZZARD FIRING FLASHLIGHT IN DAYTIME

In the Canal Zone, Panama, turkey buzzards became such a nuisance, by interfering with baits, that it was necessary to set the meat-baited cameras at dusk. This bird entangled its left wing in the cord, and half its pinion feathers were pulled out.

took him to the U. S. Forestry exhibit and showed him your work. He was most enthusiastic and told me to ask my Commission if an award would be acceptable and promising to propose a silver medal (the highest award made for exhibits of work of one kind by an individual).

Through his efforts the jury was induced to visit the Forestry exhibit and a medal was awarded to you.

Hoping that this story of how you came to receive a medal from a class in which you were not an exhibitor may be of interest and new to you,

Yours very truly,

EDGAR S. CAMERON.

After devising and testing many different machines for automatic flashlight photography, I chose the one illustrated on page 90) as the lightest (weighing less than one pound), simplest, safest, and most dependable. I patented it and dedicated its use to the public.

It consists of a small, round, malleable iron bed-plate with the edges turned up to hold a small paper box containing from one-

half to three-quarters of an ounce of flashlight powder. This plate is pierced by a screw hole in the bottom and by another on one side of the upturned flange so that it may be attached to the top of a post, stump, or side of a tree.

One side of the flange is pierced with a hole to receive a primed 32-caliber cartridge shell. Riveted to the underside of the bed-plate is another small iron plate to which is attached a spring-actuated hammer for firing the cartridge inserted through the side of the flange holding the charge of powder. The hammer is released by a long string or wire attached to the end of a metal lever-trigger.

THE AUTHOR'S AUTOMATIC FLASHLIGHT

A few inches below the apparatus is attached a small tubular air pump, operated by a spring, and connected by a rubber tube with the shutter mechanism of a concealed camera near by. The air pump is worked by a short wire extending from the pump-release lever over the cover of the box containing the flashlight powder and attached to the opposite side of the flange holding the powder box. The paper box for the powder is thoroughly soaked with paraffin inside and out before the powder is put in it and, when in place, may be exposed to the weather for several weeks without deterioration of its contents.

To operate the apparatus, an empty 32-caliber brass cartridge containing a small tuft of guncotton is placed in the opening provided for it next the hammer. The oval metal safety slide shown in the photograph is raised to cover it while the loaded powder box is being put in place and the front end of the cartridge thrust through the side of this box into the powder.

A hole for the pistol shell is first made in the side of the empty powder box by using a discharged shell as a punch. The cotton is placed in the shell to keep out the powder and help make the explosion of the primer more effective.

The wire leading to the air pump is adjusted over the top of the powder box, the hammer cocked, and the safety slide pressed down to uncover the primer. The string leading to the place where the game will give the necessary pull has already been stretched, and the spring of the air pump operating the shutter has been adjusted to work when the explosion of the powder



THREE STARTLED ADVENTURERS WERE CAUGHT IN THE AIR

This animated night picture was obtained by having the cord so arranged that, when touched, it fired a blank cartridge and immediately afterward the flashlight which photographed the animals as they leaped away in alarm. The deer on the right has raised its tail and the others keep theirs held down. The wonderful agility of these creatures is well illustrated here.



IN FULL FLIGHT HE TAKES MIGHTY LEAPS

The camera caught this animal as it was in mid-air in a frantic bound caused by the explosion of the first flashlight (see page 76).



REACTIONS TO ALARM VARY WITH INDIVIDUALS

This doe threw up her tail and dropped low on her hind legs for a mighty leap as the second flashlight caught her.



FRIGHT AFFECTS DEER IN DIFFERENT WAYS

This yearling buck, with tail down, is in the act of bounding away. This picture and that above indicate the difference in individual reaction to the same kind of alarm.



AHA! FOOD ON A FLOATING LOG

This raccoon could not resist temptation, and he pounced on a delicious morsel without regard for the string that was attached to it.

jerks up the wire to operate the air pump and shutter.

The shutter is usually set at a speed of $\frac{1}{500}$ th to $\frac{1}{2500}$ th of a second, according to the color and activity of the animal to be taken. A slow brand of powder is used, and, with the apparatus adjusted as described, the shutter opens at the time of maximum illumination from the flash.

This apparatus can be employed also when mounted on a short upright post placed in the bow of a canoe. A rapid powder should be used in canoe work if it is desired to operate the shutter in a simpler way by hand, opening it before and closing it immediately after the explosion.

On the introduction of the small portable motion-picture camera, about 1900, Doctor Chapman and I each obtained one of English make and found them valuable and interesting in field work. We obtained many films of animals in the wilds.

I was not accustomed, however, to giving lectures, and since the negatives were too small for satisfactory enlargement I gave up this method of photography which now plays an important part in education and entertainment.

With the advent of fast lenses and rapid plates the revival of stereoscopic photography has been marked in European countries, but much neglected here. Years ago



THEIR MEAL WAS DOUBLY INTERRUPTED

These twin fawns, on finding a pile of cabbage leaves behind camp, considered themselves in rare luck, but as one of them lowered its head the thread running from the stick on the left to the tree on the right released the flashlight. The picture below and those on the opposite page show what happened next.



THEY WERE CAUGHT BY THE SECOND FLARE

Both this deer and its twin, lower picture, page 89, were alarmed by the first flashlight and photographed by the second one just as they prepared to leap away. In this one the tail hangs down.



NO FAIR SCARING US TWICE

The flame of the powder for the first flash burned a string, releasing a leaden weight connected by a string with another flashlight and camera. Thus the peaceful scene in the upper picture on the opposite page was changed instantly by the effort of the fawns to bound away in different directions just as the second disturbance occurred.



THE OTHER TWIN RAISED HIS "FLAG" AS HE TURNED TO FLEE

This picture and the lower one on the opposite page were taken at the same instant; comparison of them will show the different physical reactions of the two fawns.



THE AUTHOR'S AUTOMATIC FLASHLIGHT MECHANISM

This light and simple apparatus can be screwed to a tree or post so that when the baited or taut string leading to the lower end of the lever on the left is pulled, the trigger is released and the flash fired. The explosion lifts the top of the powder box and with it the curving wire above, thus pulling up the lever to the right, operating the spring-actuated air pump and through it the shutter of the camera. Slow powder must be used, the right speed being obtained in the regulation of the shutter, which revolves during the maximum of the flash. By this method a speed from 1/50 to 1/500 of a second may be obtained (see text, page 84).

I got a modern outfit with a focal plane shutter and used it frequently in daylight and flashlight photography of wild animals and birds. Such a camera is large and heavy, discouraging most persons from taking it into the wilderness.

STEREOSCOPIC PICTURES OF WILD LIFE

Many of my night pictures of deer and other large game animals were taken in stereoscopic form (see illustrations, pages 66 and 67). If the positive is made on glass instead of paper, the beauty and naturalness are much enhanced by a strong light from the reverse side bringing out the

most minute detail.

I consider this use of the double lens by far the best way of showing small pictures, and any person who would specialize in thus presenting the wild life of this country should achieve distinction and be of great service to all who enjoy seeing bits of wild nature in a form so closely resembling the original.

TWO SUCCESSFUL PICTURES ON A SINGLE PLATE

Once when my supply of plates for a small hand camera was exhausted in a remote wilderness, I found that by capping one of the twin lenses of the stereoscopic camera I could make a successful exposure of one-half of the plate and, reversing the process, take an entirely separate picture on the other half.

While I was taking luncheon at the White House one day in 1907, President Roosevelt asked a waiter to bring from his bureau upstairs

some of my wild-life pictures. I noticed that the photographs brought to the table were all in stereoscopic form, and explained that such pictures had little value unless examined through a stereoscope.

"Why," exclaimed our host, "should I use a stereoscope when I have only one eye?"

Observing that his statement astounded us all, he explained that while boxing with a naval officer several years before he had received a blow which destroyed the sight of one eye. He chuckled to think that the disability had not been detected by anyone outside the family circle.

CHAPTER IV

Some Birds of Northern Michigan

THE camp clearing in the forest, located near the shore of Whitefish Lake, with a small stream flowing through it, attracts many kinds of birds in their proper season. At no one time are many species represented and only a few habitually occupy the camp premises and patronize the feeding boxes and suet put out for their entertainment. The birds that inhabit the forest and the areas of more open country here and there far outnumber those seen about camp.

Blue jays, grackles, nuthatches, catbirds, and chickadees come to the suet hung on the side of a tree and also at times go to the feeding boxes. Juncos and white-throated and white-crowned sparrows are regular visitors to the feeding places, and goldfinches, in bright livery of golden yellow and black, often cling balancing on the big Canada thistle tops.

BIRD FOOD IS ABUNDANT

Cedar birds, or cherry birds, as they are more commonly termed here, raid the fruit on our mountain-ash trees, which they share with pine grosbeaks and robins. The robins, among the most common of the camp birds, have a varied diet, including many angleworms, the descendants of those brought to this region by the author's grandfather.

Kingbirds appear now and then, but the phoebe is the only flycatcher that nests on the premises, where it regularly builds its nest on beams under the roof of the boat-house. House wrens use nesting boxes placed for them, and the ruby-throated humming bird makes its summer home in the clearing where it may be seen daily hovering about the garden flowers until its departure for the South in the middle of August.

The yellow-bellied sapsucker makes free use of the trees in the clearing, especially of the mountain ash, in the bark of which it cuts symmetrical series of pits, from which it obtains sap and perhaps insects. From the alder thickets along the stream come the mellow notes of the cuckoo and the rattling call of wandering kingfishers.

By day spotted sandpipers skirmish along the borders of the stream and on rare

occasions at night great blue herons try these waters for fish. Sharp-shinned and Cooper's hawks examine the clearing at intervals by day for any stray bird they may capture, and the great horned and the barred owls visit the borders of the adjacent forest by night, usually on the lookout for any showshoe rabbit that may leave its brushy shelter tempted by the clover patches. Sometimes on clear moonlight nights in summer the deep-voiced hoots of these marauders contrast discordantly with the lovely cadences of the white-throated sparrow.

When heavy frosts come in autumn, most of these birds have gone to a warmer climate for the winter; but the ruffed grouse, ravens, and owls remain as the most conspicuous wintering species. The arrival of cold winter weather is usually accompanied by the advent of closely united flocks of the beautiful snow buntings that give life to many a landscape, that without them would be dreary.

The trim figures and the pretty, confident ways of the ruffed grouse under protection make them favorites with every one at the camp.

Early in the present century, with the increase of farms and other cleared areas, meadowlarks became much more numerous than formerly. In 1922 my attention was first directed to the presence of flocks of mourning doves on farms near Marquette, a thing so unusual that it caused comment. Some persons believed the birds were the passenger pigeon returning.

The coming and going of birds with the progress of the seasons present a living panorama of surpassing interest to all lovers of the wilderness in camp, and the arrival of a newcomer among the familiar visitors is always an event worthy of record.

SUMMER BIRDS ABOUT CAMP

For a more nearly complete picture of our summer bird life, the following admittedly incomplete list is given of the species known to breed at the camp or in the surrounding district. Among them are included some waterfowl that frequent Whitefish Lake. The complete list of spring and fall migrants that pass our way would



MERRY LITTLE CALLERS GLADDEN THE CAMP

Bluejays are not uncommon visitors to the feeding table at Whitefish, where they are devoted to the suet and to mixed grains. The bright colors and vivacious ways of these birds make them most attractive neighbors.

greatly increase the number of species mentioned here.

Common visitors are the pied-billed grebe, hooded and red-breasted mergansers, mallard, blackduck, woodcock, bittern, great blue heron, solitary sandpiper, spotted sandpiper, and killdeer. Cooper's, the red-tailed, broad-winged and sparrow hawks are numerous, as are also the barred and the western horned owls (both yearlong residents).

Ruffed grouse, black-billed cuckoo, belted kingfisher, hairy and downy woodpeckers, red-headed woodpecker, yellow-bellied sapsucker, northern pileated woodpecker, flicker, nighthawk, chimney swift, ruby-throated humming bird, kingbird, phoebe, olive-sided flycatcher, wood pewee, alder flycatcher, least flycatcher, crow, raven, blue jay, cowbird, meadow lark, bronzed grackle, red-winged blackbird, purple finch, goldfinch; vesper, white-throated, and chip-ping, field, song, and Harris sparrows can be seen often.

There are also the slate-colored junco, the rose-breasted grosbeak, the barn swallow, the tree swallow, the cedar waxwing; the

black and white, black-throated blue, myrtle, chestnut-sided, Blackburnian, and black-throated green warblers, the oven-bird, Grinnell's water thrush, the house wren, the white-breasted nuthatch, the chickadee, the catbird, the robin, the olive-backed thrush, the wood thrush, and the bluebird.*

BIRDS AT THE CAMP FEEDING BOXES

The list of birds visiting the feeding boxes about the camp indicates that these avian luncheon stations are never such popular resorts there as they are in some places. The reason for this must be an abundance of natural food in the vicinity. Certainly there is a scarcity of small birds interested in a free dining place.

Next to the jays, the yellow-bellied sapsucker, the white-throated sparrow, and the nuthatch are the principal visitors. These are followed in the fall by a large number of juncos.

* The foregoing list is based partly on identifications made by Norman A. Wood, the well-known ornithologist, new Curator of Birds at the University of Michigan, who visited camp on three occasions in bird migration periods.

In 1920 a pair of catbirds visited camp, the first I had seen in the entire region. Before their fledglings could take wing, the camp cat ended their career. These catbirds had been about camp for a month before learning to eat suet. The fact that the following year a pair returned and immediately went to the feeding place was evidence that one at least was a former visitor.

THE ENGLISH OR
HOUSE SPARROW
AT CAMP

In the snow-covered States more than half the English sparrows starve in winter, for the replacement of the horse and stable by the automobile and garage has deprived them of their main food supply during the more rigorous months. My sympathy was first aroused in behalf of this old-time immigrant by an incident that occurred some 15 years ago.

One day while I was looking out of a camp window at Whitefish Lake at several species of birds at the feeding tray, I saw to my surprise a male English sparrow feeding with the other visitors. It was the first time I had seen such birds on a small location surrounded by dense forests.

The next day the female appeared, but stayed only a few minutes, and I inferred that the pair had a nest about the barn. On being questioned, the caretaker said that he had noticed these sparrows for several weeks, and a few days before had found the nest on a plank projecting below the eaves of the barn. He thought that the pair had reached our clearing by following



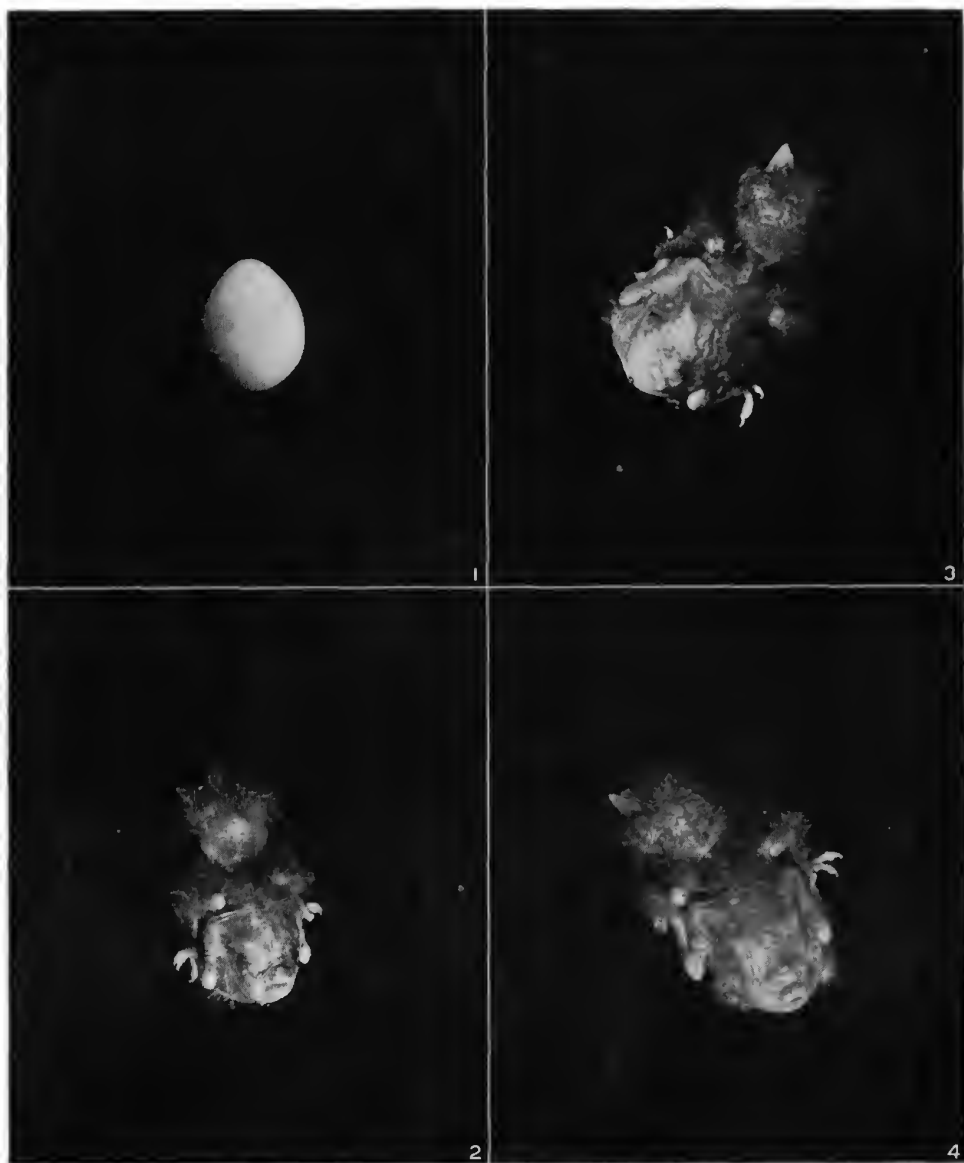
A PHOEBE CHOSE THE BOW OF A SKIFF FOR HER NEST

This was an example of the many odd places these birds take for their nests, always with forethought to insure good protection from the weather. They show remarkable confidence in man. This pair went quietly about its affairs day by day with people all about.

grain spilled from the wagon on its way back from the railway station.

Going up a ladder, I found four young birds several days old. In a few weeks these youngsters came daily to the feeding place, and I came to regard them as an interesting addition to the wild birds. On leaving camp that fall I requested that at the time the chickens were fed, a little grain should be scattered about for the benefit of the only small birds likely to be seen about camp in the winter.

On returning the next season, I made inquiries about the sparrows, for I had often wondered whether they would live amid the deep snows and winter blasts. I was



THE CAMERA TRACES THE PHOEBE'S LIFE FOR THE FIRST WEEK

The egg is one of those in the boat nest on page 93; the next seven pictures show the development of the young day by day from the moment of its hatching. Life size.

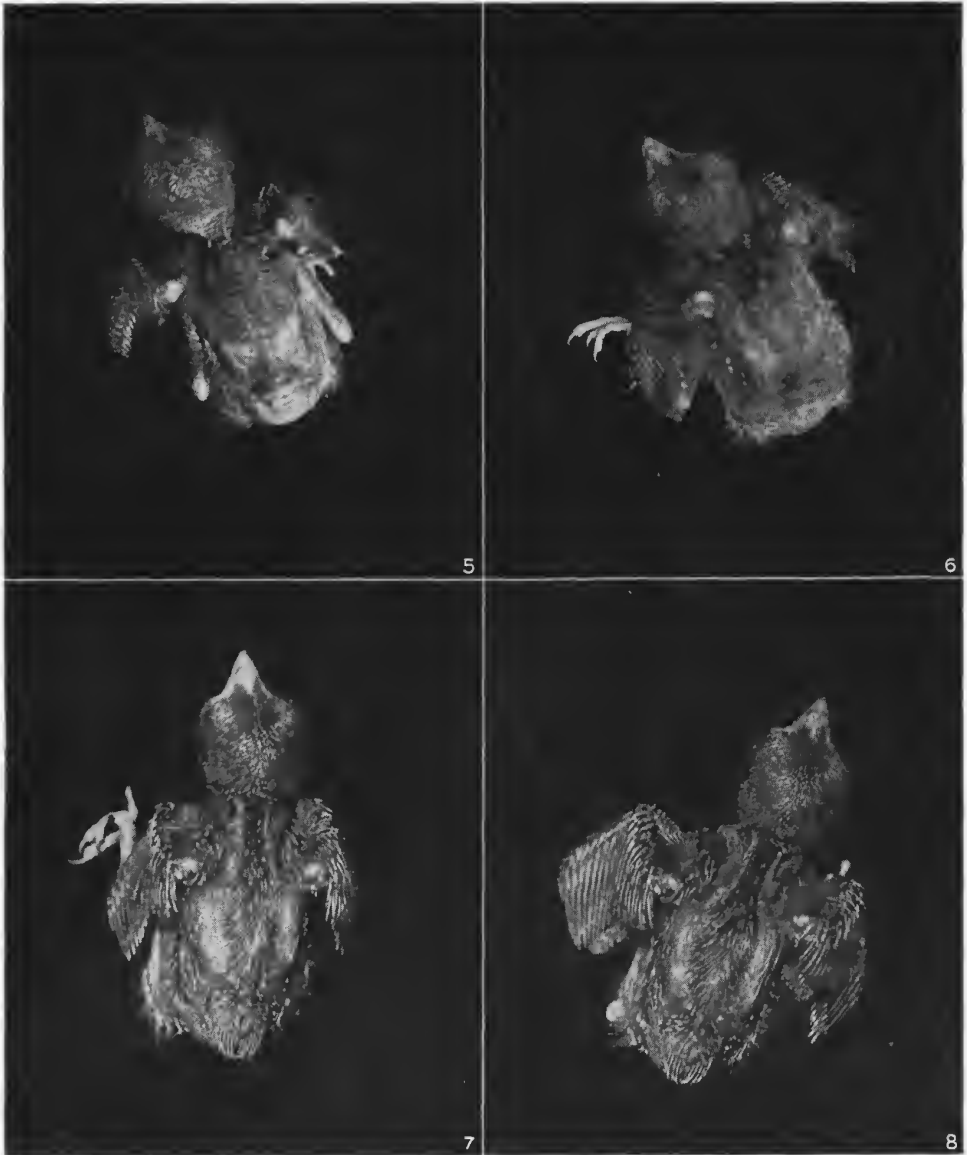
told that this little family had been seen daily in the barn yard until the middle of February, when an unusually severe cold wave from the west had sent the temperature to 35° below zero, the camp being too far south for the wind to be tempered by the open waters of Lake Superior.

The day following this the birds were not seen, and an investigation showed them huddled together near their former nest, all

the victims of this intense cold. Rarely do birds in good condition, and more or less accustomed to the rigors of their surroundings, perish by freezing. The tragic end of this little family contains a lesson.

THOREAU FED WILD BIRDS IN WINTER

It has interested me to know that in 1845, when Henry David Thoreau lived alone in his little cabin by Walden Pond,



THE LITTLE PHOEBE LEFT THE NEST FIVE DAYS LATER

By patient effort the author obtained daily pictures showing its rapid growth. At 12 days it was able to explore a bit of the world.

he was one of the first of American lovers of nature to feed birds in winter. By putting out food, he brought many wild visitors to the threshold of his hermit retreat.

Concerning this subject he wrote: "In the course of the winter, I threw out half a bushel of sweet corn, which had not got ripe, on the snow crust by my door and was amused by watching the motions of the various animals which were baited by it.

In the twilight and the night the rabbits came regularly and made a hearty meal. All day long the red squirrels came and went and afforded me much entertainment by their maneuvers.

"At length the jays arrive, whose discordant screams are heard long before, as they were warily making their approach an eighth of a mile off, and in a stealthy and sneaking manner they flit from tree to tree,



RUBY-THROATED HUMMING BIRDS CHARM

A pair nested each year in the apple trees at camp (see, also, upper picture, opposite page).



WHITE-THROATED SPARROWS SING
SWEETLY

They have always been regular summer boarders at the camp feeding places.

nearer and nearer, and pick up the kernels which the squirrels have dropped.

"Meanwhile also came the chickadees in flocks, which, picking up the crumbs the squirrels had dropped, flew to the nearest twig, and, placing them under their claws, hammered away at them with their little bills, as if it were an insect in the bark, till they were sufficiently reduced for their slender throats."

It is indicative of Thoreau's keen powers of observation that at that time, when much of New England's original forest had gone down before the ax, he recognized the value to wild life of the variety of vegetation that made up the second growth.

In referring to this subject he wrote, "The partridge and the rabbit are still sure to thrive, like true natives of the soil, whatever revolutions occur. If the forest is cut off the sprouts and bushes which spring up afford them concealment and they become more numerous than ever."

Elsewhere are recorded my similar observations in the cut-over region of northern Michigan.

At Marquette and Whitefish Lake Camp, as well as in the District of Columbia, I have found the robin among the earliest migrants to come in spring and to leave in fall. It is a true migrant and gathers in flocks in fall preparatory to leaving for its winter home. Contrary to this custom a few individuals often remain very late, apparently finding late hanging berries and some worms still near the surface of the ground.

Occasional individuals have been known to winter north as far as southern New England. As spring approaches, and the frost leaves the ground, robins begin to appear in northern Michigan. They seem to be able to find worms and other food, while a host of other small migrants await more clement weather.

In the Northern States and in Canada the robin is the most appreciative among all our feathered friends of the protection and the increased food supply to be found about man's abodes. As spring advances, these birds separate into pairs and appear in increasing numbers about the premises in town and country, and build their nests in adjacent trees or even on projecting parts of houses. This confidence in the friendliness of their human neighbors, the sprightly way they run and hop about their hunting grounds on lawns and in gardens,

and their cheering song poured forth in abundant measures render these birds prime favorites.

In the South their attractive qualities are less evident, for there they appear as migrants in flocks, without song and most of the other qualities that render them attractive in the North. During their winter sojourn in parts of the South they commonly roost in vast numbers, at central gathering places in large thickets, at which places they were formerly killed in a wholesale manner and shipped to city markets as a fat and delectable game bird. This practice was stopped after the Federal Migratory Bird Treaty Act was passed.

In recent years the number of robins has increased enormously in northern Michigan, as well as elsewhere in its range. The increase has come from several favorable causes, among which the protection given by the Federal law, aided by a growing sentiment for bird life, is probably the main factor. To this may be added the very great increase of suburban and country homes, with lawns, gardens, and trees that seem to meet perfectly the needs of these birds.

Still another favorable cause in northern Michigan and elsewhere, no doubt, is found in the very large areas of lands cut over in lumbering operations that have become covered with second-growth deciduous trees and other vegetation, among which are many wild cherry and other fruit-producing species. Because it frequents the vicinity of man, the robin probably has, except for the house cat, less to fear from natural enemies than most other birds.

At Marquette, in Washington, and in Florida I have found the robin entirely indifferent to the varied food displayed in feeding boxes or elsewhere for the benefit of birds, unless small fruits are supplied. This attitude toward artificial feeding places appears to be shared by our other thrushes and is due, of course, to the character of their food.

The feeding habits of robins on lawns are always interesting to the observer. They are tireless searchers for angleworms, especially in the afternoon when the worms come to the surface most abundantly. The bird stands alert, its head cocked slightly to one side in the attitude of listening, and then it runs a short distance and pulls out a delicious, fat angleworm. It seems difficult to determine whether the bird in such



A HUMMING BIRD POISES FOR FLIGHT

The pair left camp about August 15. Migrants from farther north sometimes replaced them.



A WOOD THRUSH FINDS A MOUNTAIN ASH

The song of this feathered troubadour forms a pleasing part of the bird chorus about camp.



THE YELLOW-BELLIED SAPSUCKER IS DESTRUCTIVE

These woodpeckers appeared to be very fond of the sap of the mountain ash trees. In this picture one of them is at work making a series of pits in the bottom of which the sap collects.



THE YELLOW-BELLIED SAPSUCKER HAS INSTINCT FOR DESIGN

The basins were made in this mountain ash tree in six weeks, probably by one bird, and served not only to collect sap but also to catch flies attracted by the sweet fluid.



BRONZED GRACKLES ENJOYED THE ROCK GARDEN

This pair nested in the end of a tin stovepipe at the Whitefish Lake Camp.

instances depends on sight or on some infinitesimal sound made by the worm forcing its way through the soil.

Three or four pairs of robins nest regularly about the camp clearing, often in some sheltered place among the mass of Virginia creepers covering the south end of the main cabin, or low in young balsams or other small trees in the yard, never far from the cabins and rarely more than eight or ten feet from the ground. One season a house cat had been brought to camp and was much in evidence about the premises. The robins appeared to sense at once the danger from this enemy of all birds, for they abandoned their usual homesites near the ground and all placed their nests well out on branches of large elm or maple trees in the camp clearing, at a height of 30 to 40 feet.

One year when no cat was at camp the doings of a pair of robins attracted my attention. Their actions indicated that they were looking for a nesting place. For a day or two they wavered indecisively between a location about eight feet from the ground in the Virginia creepers on the end of the cabin, or about the same height in a

broadly branching young balsam at the edge of the lawn.

To what extent the two sexes cooperated in the final decision could not be determined; but the female carried the first twig and laid it in the crotch of a limb of the balsam, and there the nest was made. The construction of the nest itself was no doubt instinctive, for it conformed in material and structure with those made by others of their kind. Reason may have guided this choice of location, for about the base of the tree lay the lawn abounding with angleworms and other insects, while wild and domestic berrybushes were all about, thus insuring an abundant and readily obtainable food supply for the young.

About August 15 every year, after they have reared one or two broods, most of the robins suddenly disappear from the places around Marquette in which they were numerous one or two days before. Because I have observed this to occur year after year, and because I have found robins plentiful during the last half of August and early September in Ontario, north of Lake Superior, I am inclined to the belief that the



THESE VISITORS DROPPED IN FROM THE FAR NORTHWEST IN OCTOBER, 1934

Perhaps once in a lifetime an Atlantic coast bird lover may see such a flock of evening grosbeaks. Here the birds feed in a mountain ash tree at the author's summer camp, near Whitefish Lake, Michigan.

birds from northern Michigan may make a short migration to that area, where a greater supply of wild berries exists until later in the season than farther south.

About September 15 robins are usually again abundant at Marquette and in other parts of northern Michigan, often in fact in such increased hordes that in the few days they remain they almost clean up the mountain-ash berries which have been maturing during their absence and upon which the ruffed grouse depend in fall and early winter.

To these desirable game birds the robins have, within recent years, become serious competitors for this fall and winter food supply. The continued increase of robins and their resulting depredations on small fruits both cultivated and wild may develop a problem difficult of practical solution. As a matter of fact difficulty has already occurred in some places.

The bronzed grackle (*Quiscalus quiscula arvensis*) is one of the rather common birds along the south shore of Lake Superior, especially in the countryside about the city of Marquette. These birds breed in trees

on the border of town and are common visitors to yards where food is obtainable. The young are on the wing the last of June.

During the early summer they are numerous, a dozen or more being persistent visitors all day at the feeding stand on our lawn at Marquette. Like the robins, nearly all of them suddenly disappear about the middle of August and return, again like the robins, about the middle of September.

GRACKLES APPRECIATE THE AUTHOR'S FEEDING STANDS

It has long been my theory that these birds might go to some favored haunt north of Lake Superior to return later. This disappearance of the grackles cannot be a food migration, for the fifteen or twenty birds being fed abundantly from morning to night on our lawn disappear at the appointed time with their fellows.

This early movement by the grackles and robins possibly marks the beginning of a southern migration of the birds along the south shore of Lake Superior, their places being taken in September by the migration southward of more northerly breeding



FROM THE FAR NORTH WINTER BRINGS GUESTS

Snow buntings come from their summer homes on the far Arctic tundras to visit the Northern States each winter. They usually appear in flocks with the early snowstorms and keep in the main about open fields.

birds, for the grackles breed as far as Great Slave Lake and the robins even beyond.

For many years from two to four pairs of grackles nested as a little colony some eight or ten feet from the ground in vines growing abundantly on the south end of the main cabin at Whitefish Lake Camp, disappearing for the season as soon as their young were able to follow, about the end of June.

In the spring of 1933 a remarkable change took place in the nesting habits of the three pairs of grackles that came to Whitefish Lake Camp that season. One pair built its nest on top of one of the timbers immediately under the floor of a small boathouse standing on piles in the shallow water on the margin of the river. The nest was on the side farthest from shore and about seven feet from the water but within easy reach of the hand of any one standing on a walk along one side of the piling supporting the house. Another nest was placed close under the overhanging peak of the roof at the front end of the camp barn on top of a projecting pulley beam about three feet long and 25 feet from the ground.

The third nest was in the open end of a short horizontal stovepipe, swiveled and with a weather vane, to keep it pointed away from the wind as a discharge for smoke from the chimney through the stovepipe supporting the movable top, also about 25 feet from the ground. The top of the upright pipe evidently was not blocked by the nest, for one of the unfledged young fell down it into the stove in the cabin where no fire had been made in the course of the nesting period.

LITTLE GREEN FROGS THE VICTIMS

While feeding their young the pair nesting under the floor of the elevated boathouse was watched at short range as were the others to a lesser extent, with the aid of a pair of field glasses. By this means it was learned that all the birds were persistently hunting along the shallow margin of the river for small green frogs which they carried to the nests. There the frogs were held underfoot and torn to fragments before being fed to the nestlings.

The surprising change of habits among a



THE HARRIS SPARROW IS AN ARISTOCRAT

On October 1, 1933, the author for the first time saw a small flock of these handsome sparrows about the feeding tray at Whitefish Lake Camp. Adults of this species, rare visitors, could be easily recognized by their pink bills, with black on the heads and throats, gray checks and white wing bars. The gray heads, black spots on the breast and sides and white wing bars distinguished the young. They breed north and west of Lake Superior to the barrens, wintering south to Texas. They seldom occur east of Michigan.

small group of colony nesting birds to become solitary occupants of a grotesque variety of homesites, with the similar change on the part of robins detailed above, are excellent instances of the use of reasoning power among birds; the common cause of these changes being that on each of these seasons the family of the camp caretaker had brought to camp a cat, the mortal enemy of bird life. Constantly prowling

pecially at the south end where the grackles usually nested.

THE RED-HEADED WOODPECKER

About 1923 I saw the first pair of red-headed woodpeckers in this region. The birds passed the summer among the trees on the grounds about my home in Marquette and have reappeared there every succeeding year until last year.



AUTUMN BRINGS WELCOME VISITORS

As the cool nights begin in the fall, slate-colored juncos become common about the feeding places at camp and continue their visit until after snow comes.

about the premises, the cat could easily have climbed to any of the usual low nesting places.

The grackles were evidently more wary than the robins and would not trust their treasures in the trees, but chose absolutely cat-proof places about the camp buildings. It was interesting to note that had another pair of grackles wished to occupy a similarly safe place this season it would have been almost if not quite impossible to find it about camp. It may be noted here that in the nesting season the camp is little frequented, es-

pecially at the south end where the grackles usually nested. The first two were especially conspicuous on account of their persistent habit of clinging near the top of a tall flagpole on the house. They would occupy this high point of vantage for hours at a time, seemingly using it as a lookout place, from which they made excursions now and then in long descending loops, apparently to capture flying insects, and then returned to their former position.

Late one September, while I was passing a week in camp



THE BRONZED GRACKLE EXCELS AT AERIAL ATTACK

The male grackle is pugnacious at the feeding box, and ousts the younger birds and females by descending with outstretched claws. Note the defensive attitude of the occupant.

taking a series of fungus pictures, there fell an unusually cold rain mixed with snow. Looking out of a window one afternoon, I saw a large flock of cedar birds circling the clearing. They soon descended and alighted on two mountain ash trees burdened with brilliant red berries. They had evidently just arrived from across Lake Superior in the fall migration, and were tired and hungry.

CEDAR BIRDS IN PERIL

Enjoying the sight as the birds distended their craws with the ripe fruit, I was surprised to see several, one after another, fall from their perches and lie motionless on the ground. This mystifying happening continued until more than a dozen had fallen. I decided it might be well to frighten the remainder away.

As the flock rose over the treetops, two more dropped. I picked up all the fallen,

and put them in a covered basket, which I placed near the kitchen stove. In a short time I was surprised to hear chirping and fluttering in the basket, proving that the ailment of the birds had been the benumbing effect of eating frozen berries. The heat from the stove had revived them. The next morning all were alive, and when released the little flock headed south, apparently none the worse for its adventure. Had the birds been left on the cold ground when they fell, no doubt all would have perished.

MIGRATORY WILD FOWL

Migratory wild fowl that visit the southern shore of Lake Superior are few both in number and in species compared with those in many other areas to the east and west. The abundance of lakes and streams in this region offers favorable conditions for these



THE PILEATED WOODPECKER DIGS DEEPLY

These large birds, with a wing-spread almost equaling that of a crow, are sparsely scattered through the forests of northern Michigan. The excavations made in the decaying trunk of a dead hemlock are the work of this bird in search of fat grubs. Two of their workings, including the one shown above, exist now by the side of the road leading to Whitefish Camp.

birds save for the general lack of food plants in these waters.

At present only small numbers of two species of edible ducks, the mallard and the black, or dusky, duck, breed on the marshy borders of Whitefish Lake. Before 1900 the wood duck bred sparingly in this area, but since then, for some unknown cause, it has become rare. The pied-billed grebe sometimes breeds about the small lakes, as does also the great northern loon. The last-named also breeds on some of the rocky islets along the shore of Lake Superior.

The breadth and depth of Lake Superior, with its low temperature and lack of food plants, seem to account for the passing of the main migratory flight of shallow-water ducks to the east or west of it. These conditions do not appear to influence equally some of the other wild fowl. Many flocks of Canada geese cross the lake in spring and fall, but rarely pause near shore.

Considerable flights of lesser scaups, with smaller numbers of golden-eyes and buffleheads, occur, with occasional redheads and canvasbacks. On islets along the shores of Lake Superior and in small lakes the red-breasted merganser breeds sparingly.

The herring gull appears to be the only member of its family that is common. It breeds along the shores of the lake. In winter a few of these hardy birds remain about open harbors.

So far as is apparent to the ordinary observer, the numerous small, shallow lakes and marshy streams in this region should be favorable for an abundant production of aquatic plants so necessary for the maintenance of wild fowl. Some of the best of such plants, however, are strangely absent, and conditions are evidently adverse to their growth.

CADDIS-FLY LARVÆ AND WILD RICE

For more than 50 years the writer and others have repeatedly tried to introduce wild rice and other food plants for wild fowl without success. The only result from these numerous plantings of wild rice in apparently favorable places either in spring or fall was the appearance above water of occasional stalks that were soon eaten by muskrats.

After many years of observation I have come to believe that the larvæ of the caddis fly, exceedingly abundant in the shallow fresh waters of northern Michigan, are accountable for the constant failures to grow wild rice in many places in that region.

In no other part of the country are caddis-fly larvæ more numerous than in small lakes and streams about Lake Superior. Often, in July, caddis flies take wing by millions, and vast numbers of them may be seen fluttering about lights at night or stranded on beaches.

The larvæ of these insects live along muddy bottoms in spring and are, as usual, protected by a tubular coat made by them from little fragments of wood and other material as a protection against their enemies.



ANGER STIRRED THIS NIGHT ROVER TO LOUD EXPOSTULATION

While gliding along Whitefish River one night looking for deer, the author espied this barred owl perching on a projecting dead sapling. He held camera in one hand and the flashlight in the other as he fired. The explosion and the blinding light so startled the creature that it fell 15 feet into the water and then floundered ashore uttering cries as if it was swearing like a trooper.

They are known to subsist on both animal and tender vegetable matter. After noting the apparent effect of these larvæ on other aquatic growths, I became convinced they also ate the tender wild rice plants as they began to grow on the bottom.

INSECTS ATTACK THE ROOTS

On different occasions I put out the roots of Japanese iris and pink and white water lilies at Whitefish Lake Camp. In a short time the iris planted in shallow water near shore toppled over. Investigation revealed a great number of caddis-fly larvæ clustered about their tender white roots, upon which they appeared to be feeding.

On the other hand, the water lilies, planted in the mud in several feet of water, did not send up their leaves until July, months after their usual time and not until after the caddis flies had taken wing.

I noted this fact and by trial discovered that wild rice seeds planted in mud in a box a foot below the surface and surrounded by wire gauze would send up vigorous stalks and come to maturity with well-developed seeds. This experiment proves that the water, soil, and climate are suitable to the plant.

One pleasant October day, while canoeing on Whitefish Lake, I saw a scaup duck come flying a short distance above the water in



WHITE-BELLIED NUTHATCHES ARE "AVIAN FLIES"

These assumingly grotesque little birds attract attention by walking about on tree trunks head down.

a direction that would bring it within gunshot. My gun was raised in expectation; but when the duck was about 75 yards away, I saw that it was being closely pursued by a duck hawk flying a few yards higher in the air.

A BROADBILL LOOPS-THE-LOOP

As the hawk suddenly turned down to seize the duck, the latter, with almost incredible quickness, turned a series of three somersaults and, striking the water head foremost, disappeared. As the outwitted hawk flew up, it noticed the canoe and went off. Soon the bill and upper half of the head of the duck appeared on the surface of the water about 50 yards from me, and it con-

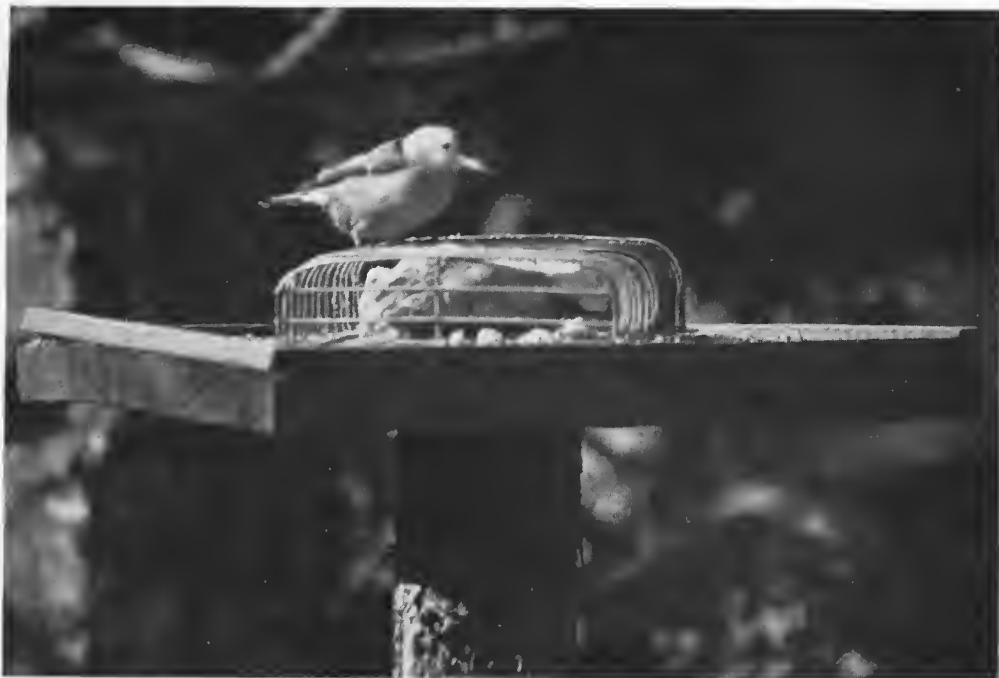
tinued in this position for some time watching for its enemy. Thinking that the bird had earned its freedom, I paddled away, leaving it unmolested.

SCARCITY OF SHORE BIRDS

The number of kinds and the variety of habits and wide distribution of shore birds considered, they are notably scarce about most of the shores of Lake Superior. During the spring migration in May golden plovers were formerly seen on open pasture and meadow lands for a few days, being stragglers from the great flight up the Mississippi Valley, from their winter home in South America. In the fall none were seen, for they go south by way of the Atlantic coast.

In the course of my many years about Lake Superior I do not recall seeing more than a dozen each of Wilson's snipe, yellowlegs, and woodcock. The last named became a visitor to the alders in the damp bottoms near camp at Whitefish Lake after angleworms had been introduced. One little marsh game bird, the sora rail, was present in fair numbers every September. That such an apparently weak bird should cross the widest part of Lake Superior is evidence of its ability to sustain long-continued flight.

Whitefish Point, extending out into Lake Superior along the side of a small bay on the south shore not far west of the Sault Ste. Marie, is a notable point of departure for hosts of small birds and for hawks moving northward in spring. In marked contrast to the barren shores farther west the



THE WHITE-BELLIED NUTHATCH LIKES SUET

One is shown here on the feeding table in quest of that dainty. They sometimes alight on the snow among the juncos in fall searching for food.

point is a favorite gathering place also for migrating shore birds of numerous species.

The spotted sandpiper, or "tip-up," as it is commonly known, is the only shore bird that passes the summer about Whitefish Lake and in similar places in this district. This active and restless little bird, with its piping notes and oddly bobbing form, enlivens solitary places and is warmly welcomed by fishermen and campers along the waterways.

Every fall small parties of semi-palmated sandpipers drop in for a short stay on the marshy borders of the sand bars of the slough at Whitefish Lake. No doubt the small numbers of waders in this region during the migration compared with their abundance in other areas in similar latitude are due, as in the case of ducks, mainly to lack of properly stocked feeding grounds.

The most highly esteemed game bird of the northern uplands, whether for sport or the table, is the ruffed grouse. It is erect in figure and clothed in rich gradations of brown and gray, with a ruff of iridescent black about its neck and a sweeping fan-like tail. Its presence is frequently disclosed to the visitor in the forest by a sudden

whirr from almost under his feet and a meteoric flight through the trees, startling even to the expectant hunter or the trailing fox.

With the extinction of the passenger pigeon, once so numerous about Lake Superior, and the scarcity of shore birds and wild fowl, the perpetuation of the ruffed grouse, the sole resident game bird of the region, becomes especially important.

THE RUFFED GROUSE IN DANGER

In my early camping trips I found these birds in many small clearings, in second-growth thickets, and along old lumber roads, where they were attracted by the berries, insects, seeds, and the abundant sunlight of such places. For years I had the impression that the species was generally distributed and everywhere numerous. Later I found that in the heavy main forests, especially in localities more than a quarter of a mile from water, scarcely a grouse could be seen, except when winter sealed their usual haunts with snow and ice and drove them into heavier timber.

In later years, when the number of local hunters increased tenfold and the automobile afforded access to the more remote



FOREST DWELLERS ARE RARE GUESTS

Pine grosbeaks, the males decked in red, were not common visitors at camp, where they usually appeared in the fall in little parties. They love wide forested regions and their coming to the clearing was always welcome. One autumn, however, a flock of more than two dozen of them remained about the place for several days, feeding on mountain ash berries.

places, the grouse of upper Michigan decreased to a point where extinction was threatened, and appeared certain when two such cold, wet springs occurred that hardly a young bird survived.

A REMARKABLE INCREASE

In 1917 the Legislature ordered the season closed for two years, and the result exceeded all expectations. The first year of protection showed a great many scattered coveys, and the next they more than doubled. In the spring and summer of 1919, preceding the reopening of the season, the birds were found in numbers never known before in the history of that region, auto-

mobiles being stopped frequently to avoid hitting birds dusting themselves in the woodland roads.

With a daily bag limit of five birds and a total of 25 for the season, one might have supposed that the number killed would not have equaled the best years of the earlier days. Surprisingly enough, they were brought in the first day by hundreds, the next week by thousands, and then by tens of thousands, the total for the short season exceeding one hundred thousand. In Minnesota, in 1920, after a similar closed season, but with larger bag limits, the kill in the course of the time allotted was unparalleled, the total exceeding 500,000.



BLACK-BILLED CUCKOO NO TRESPASSER

In summer these birds are occasionally seen or heard in the border of the forest about camp. Unlike the European cuckoo, they do not lay their eggs in other birds' nests but build their own. By a rare chance one alighted before the focussed camera in the open at camp, and its portrait is shown above.

Many persons might naturally believe that this wonderful increase was due wholly to the closed season. This undoubtedly made such a showing possible, but the result was due in part to a gradual and favorable change in environment during some 30 years preceding.

BIRDS NOW SHOT ON THE WING

Through overshooting and unfavorable weather, the grouse of Michigan, Wisconsin, and Minnesota had been greatly reduced until only scattered birds were to be found here and there. With a two



JOLLY ROBIN LIKES HUMAN COMPANY

Robins are among the most abundant summer birds of northern Michigan, where, as elsewhere, they appear to appreciate the good fare about man's abodes. This one is perching in a mountain ash tree at camp in the fall. In the author's boyhood days robins were comparatively uncommon in this region.

years' closed season the young of these survivors had an opportunity to establish themselves in thousands of second-growth areas where few birds had ever had a chance before.

In fact, theoretically I estimate that one pair of grouse and their offspring thus protected might produce one hundred birds in three seasons. Such thinking indicates why the grouse became so numerous and spread so quickly through the entire region.

The legal daily limit of five birds has resulted in a new form of sport in northern Michigan. Formerly hunters were



THE MALLARD DUCK NESTING IS HARD TO FIND

This one was photographed sitting on the large clutch of eggs shown below.



THE MALLARD HIDES HER ABODE WELL

One season the author found a nest containing 14 eggs in the slough at Whitefish Lake.



THIS IS PROBABLY THE ONLY FLASHLIGHT EVER TAKEN OF WILD DUCKS

A pair of mallards raised their young nearly every year in the marshy waters of the slough at Whitefish. By good fortune one summer night the author found the half-grown young and took this photograph of them (see text, page 56).

accustomed in this region to kill the grouse on the ground or in the trees. With the limit set at five birds, the hunters promptly realized that their day's hunt might be ended whenever they discovered a well-filled covey. For this reason many hunters desiring to enjoy a longer time in the woods began shooting on the wing, at first using thousands of shells without much damage to the fleeing birds, but greatly increasing the day's sport.

"A dead bird tells no tales," but the many survivors of this bombardment had received a greater education regarding the ways of a man with a gun than any of their predecessors, many finally acquiring the same alertness and caution that characterize the grouse of the eastern coverts.

PECULIAR HABITS OF THE GROUSE

In the summer months the grouse have an excellent choice of food, consisting of a great variety of berries, small fruits, seeds, buds, clover, beechnuts, grasshoppers, and a multitude of young, tender leaves. In the winter one wonders at their survival, for during late years the fall flight

of the robins almost completely exhausts the mountain ash berries, which were wont to last well into winter, thus compelling the grouse to depend largely upon yellow birch and maple buds.

Fortunately, whenever the temperature is far below zero the sky is usually clear, and the grouse are active and unconcerned; but if the days and nights are dark and stormy, with the air full of merciless pellets, these birds have the habit of plunging from a high branch head foremost into deep snowdrifts, where, a foot below the surface, the heat and weight of the body form a globular retreat, in which they remain comfortable until the storm clears or hunger forces an exit.

Once, when seated in a tree watching for deer, several days after the conclusion of a heavy snowstorm, I saw what looked like a small mouse at the base of a maple tree. Then the dark object elongated into the head and neck of a grouse. Finding the weather to its liking, it emerged, walked a short distance clucking and spreading its tail and then took flight into a nearby birch for a repast upon the swollen buds.



"DARK FLYING RUNE AGAINST THE WESTERN GLOW—"

By a strange, instinctive dead reckoning which has no need of map or compass, old ganders lead the long converging lines of the migrating "honkers," or Canada geese.

Many years later, while hunting varying hares, I saw, just as a blizzard came sweeping in from Lake Superior, the swift descent of a dark body from a tree ahead and a slight disturbance in the snow. Another grouse could be seen in the same tree, and I knew its companion had sought warmth and protection in the coverlet below.

Sometimes in winter or early in spring a rain or a warm day may come that melts the surface snow. Severe weather follows, rapidly freezing the slush. At such times thousands of grouse may be imprisoned under an icy crust, and the formerly safe retreat becomes their tomb.

FOOD HABITS OF RUFFED GROUSE

In the years when ruffed grouse were abundant in the forest immediately about Whitefish Lake Camp, they rarely appeared in the camp clearing until the approach of fall, when the young were nearly grown and the ripening berries and abundant insects of this opening in the woods tempted them away from their usual cover. At this time the cultivated soil of the clearing became a favorite dusting place.

In seasons when the crops of mountain-ash berries and beechnuts fail, ruffed grouse are forced to seek a variety of food not used in more favorable times. Apparently apple trees are more resistant to frost than other deciduous growths, for they retain their leaves at Whitefish Camp during most of October and several weeks after the other trees are bare.

When there is a scarcity of food, ruffed grouse take advantage of this and visit the little orchard at camp day after day to feed upon apple leaves. During such periods they frequent the orchard practically throughout the day. Sometimes several dozen birds are present; I counted 16 one day in a single tree.

As can well be imagined, at such times the scene at the little camp clearing was an animated one. From a seat on the porch I could see the birds coming in all directions from the surrounding forest in such rapid flight that they appeared like brown streaks drawn across the forest background.

About 45 years after the disappearance of the passenger pigeon, a malady appeared that threatened the existence of the ruffed grouse. This calamity came without warn-



GREATER YELLOWLEGS VISIT THE SLOUGH

Among the few waders that came to Whitefish Lake in the course of the migration were these interesting wild fowl, nearly always as solitary individuals.

ing and at a time when the bird had reached its maximum numbers and a wide distribution. The lumbering of the great forests in this region and the development of second growth over untold thousands of acres had provided them with a great extension of suitable breeding and feeding areas. This, in combination with a short open season and small bag limit, resulted in a great increase of birds.

Every fall for many years thousands of hunters had betaken themselves to favorable localities at a time when nature was radiant with the brilliant colors of autumn. There was every prospect that America's finest upland game bird would be indefinitely perpetuated, even though subject to the toll taken by an ever-increasing number of sportsmen.

In 1922, the year following their superabundance, it was noted both before and after the beginning of the hunting season that few grouse were to be seen even in the most remote sections of northern Michigan. So alarming was this discovery that most of the sportsmen agreed among themselves to desist from shooting the birds during the remainder of the season. Some attributed

this sudden decrease to unfavorable weather conditions during the nesting period and for several months thereafter, when the young grouse are most susceptible.

Reports from the entire Lake Superior region, both north and south, indicated, however, a much more serious condition than the loss of the young of one or two seasons, for the adult birds also had practically disappeared.

A scientific investigation was begun, and although half a dozen different forms of parasites were found in the viscera or other parts of the body, no satisfactory conclusion was reached regarding the exact cause responsible for the havoc.

Like all other gallinaceous birds, the grouse here and elsewhere have long been affected by the presence of tapeworms and several other parasites. The mortality from such causes has never been, so far as I am aware, marked in this area, although elsewhere, particularly in the Northeast, there has been a periodic decrease of birds for one or more seasons at a time, such pests possibly contributing to the difficulty, but apparently never threatening extermination.



THE RED-BREASTED MERGANSER IS A CAUTIOUS BUILDER

This nest was found on Gull Rock, Lake Superior, near Marquette. A pair of the birds occurs here and there throughout northern Michigan. The eggs were well hidden in the shelter of a rock.



YOUNG SPOTTED SANDPIPERS GET INTO DURESS

Two or three pairs of these "tip-ups" breed about the shores of Whitefish Lake and along the river each season. The author photographed these recently hatched young while they were temporarily imprisoned in the camera case.



RUFFED GROUSE COME TO THE CAMP ORCHARD

When their regular food supply in the forest became scarce in fall, grouse regularly visited the camp clearing to feed on the apple leaves, which remained green after the frost had destroyed the foliage on most other trees.



THE AUTHOR'S FIRST PHOTOGRAPH OF A BIRD WAS A TRIUMPH

One summer day in 1889, he saw a ruffed grouse standing on top of the rail fence about the camp clearing. The proud drummer's anxiety as his portrait was taken is shown by the extended neck and half spread tail.



APPLE LEAVES ATTRACT THE RUFFED GROUSE

Since long before this occurrence no grouse shooting had been permitted anywhere near Whitefish Lake Camp. As the result of protection in ordinary seasons several dozen birds came daily about the clearing in early fall to feed on mountain ash berries, beechnuts, or apple leaves.



THE RUFFED GROUSE RESTS, CROP FULL OF MOUNTAIN ASH BERRIES

From 1922 to the end of 1929 not a single bird was seen about the camp, nor did the caretaker on his almost daily trips to the station, four miles to the north, see more than two birds, although the tract through which the camp road runs is heavily wooded and was previously the home of many of them.

In a large cut-over clearing half a mile south of camp it was formerly not

unusual to see a hundred grouse in a day, but none has been seen these last years. These facts prove the near annihilation, locally at least, of a game bird abundant from the days when I first visited Whitefish Lake. Throughout all northern Michigan the reports have been similar, it being not unusual for wardens, landlookers, and fishermen, who have penetrated into all parts of the wooded country, to state that they had not seen a single grouse.

If the number of ruffed grouse formerly occurring in this region is roughly estimated at one million, with two young a year to the pair, it is clearly seen that the annual kill of about three hundred thousand by sportsmen is much less than the annual increase. In 1928 a number of good-sized coveys were seen, but many of them as many as 50 miles apart.

It seems to me that for 1929 a liberal estimate would place the survivors in the fifteen counties of northern Michigan at five thousand birds. Even this reduced breeding stock might be expected, under a long closed season, to bring about the restoration of the grouse with much certainty were it not for several adverse factors.

First, the few survivors, as is usual in such cases, are likely to be the objects of a concerted attack by hawks, owls, and several kinds of predaceous animals, and their actual extermination is possible. In addition, with the nature of the disease undetermined, it is possible that the cause of the death of so many birds may have become lodged in the soil or elsewhere, and



A RUFFED GROUSE WAS A FRIENDLY CALLER

thus be carried over from year to year.

When this malady got a foothold, it is not strange that the mother grouse and her large family suffered a common fate. But the cock birds, isolated during the greater part of the year from any of their kind, appear to have been equally affected.

With domestic poultry, which is under direct control, remedies are at hand for staying the spread of contagious diseases, while careful dieting and segregation are possible. With the wild creatures of the woods, as in the case of the grouse, no such control is practicable and nature must be



MRS. GROUSE TOOK HER OWN PICTURE

A cluster of mountain ash berries was hung on a thread extending from a concealed camera to a maple bush near a fallen birch tree.



THE RUFFED GROUSE POISES FOR FLIGHT

Some of these birds in the apple trees at camp were confident of the good will of their human neighbors. Others were more suspicious, as in this instance when the proximity of the photographer caused the bird to make ready for instant departure.



THE GREAT BLUE HERON FOLDS UP AT NIGHT

This was the only opportunity the author ever had to get a flashlight of one of these birds. After he had taken its picture as it stood, it stepped down and tried to skulk away among the reeds (see page 56).



IN DAYLIGHT

Frogs and fish attracted an occasional big member of this species to the bank of the river across from the camp, but this wary bird always kept a sharp outlook and departed at the least alarm.



HERRING GULLS NEST REGULARLY ON GULL ROCK, NEAR MARQUETTE

As shown in this photograph, the home built on the rocks is composed of miscellaneous material, including straws, small twigs, lichens, a pine cone, and other objects.



THESE HATCHING HERRING GULLS PIP THE EGGS

The sharp white point on the top of the upper mandible of the young is to enable it to pierce the shell, which it sheds soon after birth.



NEWLY HATCHED HERRING GULLS ARE FLUFFY BALLS

But when the three young were 20 days old they ran away from the nest on the author's approach, two taking refuge on a rock and one dropping into the lake (see illustration, pages 122 and 123).



THIS YOUNGSTER HOPES SOON TO JOIN ITS PARENTS IN THE AIR

It is able to scamper about within three weeks of its hatching, but it must await the development of more mature feathers before taking to flight.



ONE YOUNGSTER SWAM AWAY

Little herring gulls become nimble on their feet soon after they are hatched (see illustrations, pages 121 and 124).

depended upon as the main factor in their perpetuation.

Word is received that grouse are coming back in parts of their eastern range, where they were similarly decreased. It is hoped that in the Lake Superior region they will also win the battle, and that the strutting black-plumed cock and the mother with her covey of brown-garbed young will once more greet not only the sportsmen, but also those travelers who are much more interested in the welfare of these beautiful birds alive than as a culinary delicacy.

SHARP-TAILED GROUSE ALSO VICTIMS?

At the time when the ruffed grouse had reached its greatest abundance, another member of the grouse family was establishing itself in the more open parts of northern Michigan. In the decade between 1918 and 1928, the sharp-tailed grouse began to be seen 25 miles south of Marquette and also 50 miles to the eastward, where areas of prairie invited the presence of birds heretofore found only west of Lake Superior, in which region it was common. It was estimated in the period named that more than a thousand of these grouse were living in the naturally unforested parts of northern Michigan. Because a continuous closed season protected these newcomers, it was difficult to estimate closely their numbers or to learn their complete distribution.

An old-time railway conductor, who made daily trips between Marquette and St.

Ignace, told me that for years he had been interested in seeing sharp-tails fly from the right-of-way to the prairie on either side as the trains passed through open sections. The birds came to the railroad track for small gravel and perhaps for food.

This observing conductor informed me that the year the ruffed grouse disappeared he noted also the entire absence of the sharp-tailed grouse, or "prairie chickens,"

as he termed them, and since then had seen no sign of their return. Whether this bird, of more or less migratory habits, had returned to its old home or had perished from the disease affecting its woodland kin it is difficult to determine. Should the latter cause account for its disappearance, it would be another striking example of the wide and deadly scope of the epidemic.

Until the farmers' fields invited the coming of the crow, its larger kinsman, the raven, had undisputed possession of the region bordering the south shore of Lake Superior. Although its croak was not uncommonly heard about Whitefish Lake as it flew over, I could seldom approach one within gun shot. The raven is one of the most sagacious of birds, and I have often wondered how it acquired this alertness in regions in which it had rarely been molested.

A SURPRISED RAVEN

In the hunting season, at a time when hundreds of deer were dressed in the woods, the ravens were quick to discover the opportunity for a meal. Once, when looking for a wounded deer, I heard a loud croaking in a direction I had not searched. I went to investigate. Nearing the place from which the sound came, I saw several ravens fly up from the ground, and there I found the carcass of the deer.

After I took up wild-life photography I was accustomed to place a variety of bait for wandering animals behind the house

boat near camp. What was left of it at daybreak the ravens soon finished if we were not visible. One night while we were living on the house boat, a flashlight was set a few yards away on shore and we neglected to shut off the operating apparatus as usual before dawn. Early in the morning I was awakened by a raven overhead, evidently calling to its companion some distance away that the usual feast awaited them.

Wishing to see what would happen, we remained quiet. Very soon the black-garbed scout descended from a tree top in a graceful spiral and, as it landed, accidentally struck the thread leading from the bait to the flashlight. The resulting loud explosion and the accompanying burst of smoke must have had a terrifying effect, for not once in the remainder of the season was a raven seen in this locality. Ravens seem to pass information on to their kind for their mutual welfare.

THE GREATEST BIRD MYSTERY

The final stand of the passenger pigeon was made in northern Michigan, Wisconsin, and western Ontario; and in this general region I witnessed the disappearance of this once countless species.

The flocks seem to have been driven rather gradually from their haunts in the Atlantic Coast States and the Ohio Valley. In the Lake Superior region, however, from the time of my early visits there to the date of its sudden disappearance, the wild pigeon appeared to be present each season in its usual abundance.

For a species that once far outnumbered any other game bird, the gradual decrease in the numbers of the passenger pigeon must have been due to several causes. Its range was always east of the Great Plains, in areas near the most populated part of the country. This subjected it to concentrated hunting on a great scale.



THE OTHERS TOOK REFUGE ON A ROCK

They were hardly three weeks old, but were all ready to take care of themselves (see pages 121 and 122).

Furthermore, each pair had but one young, in contrast to the domestic pigeon with double the number. The unexpected and inexplicable extinction of the bird within an exceedingly brief period, however, constitutes the greatest of all ornithological mysteries.

The pigeons came in vast flocks to Lake Superior in May. For a time before forming their nesting colonies, they flew up and down near the shore in vast flocks, into which the natives fired as they passed by. This was the only wing shooting of the birds there. More deadly methods of killing them were practiced later in the season.

After the birds had selected a breeding place, usually in the same locality year after year, the slaughter began. In addition to the local hunters, professional trappers from places outside the district were quickly notified of any gathering place, and were soon on hand netting or killing the birds by the hundreds of thousands for the eastern market, besides shipping them alive in vast numbers in crates for trap-shooting tournaments at Chicago and other large centers of population.

I never witnessed any of the wholesale destruction at the breeding places. There is no doubt, however, that such they often were, since fires were built in a circle around the roosts after all the birds had assembled for the night, and as the victims flew wildly about, confused by the smoke and flames,

they were beaten down and killed in the most relentless manner.

About the middle of July the survivors, with their young, dispersed over much of the surrounding country, gathering particularly about plains in burnt-over districts, where huckleberries, elderberries, wild cherries, and service berries were abundant. After the wild fruits were gone, many flocks moved into Canada, where a later berry season was the attraction, and by October all departed for the South, unless a heavy crop of beechnuts led some to linger.

In August, 1885, I made a trip to some large plains covered with huckleberries, ten miles up the lake shore from Marquette and inland about a mile, where it was my custom to kill, once a year, a supply of pigeons for distribution among friends. Such a hunt differed from that made to supply a few birds for camp use. I selected the young birds of the season, so readily told by the immature plumage, and it took only a few hours to accomplish my purpose. This year the birds appeared to be present in their usual numbers, and I returned under the belief that the wild pigeon would continue indefinitely in this region.

A MOCK TRAGEDY

On this hunt my companion and I ate our luncheon on an old lumber road in the forest, paralleling the border of the huckleberry plains. While I was seated behind him, a single pigeon came flying toward us along the road. Although not much of a wing shot at that time, I picked up my gun and, as the bird came near, fired. Apparently the full charge of shot took effect and killed it instantly.

It was so near that in falling it struck my friend full in the face. He had been unaware of the approaching bird, and my shot from behind was startling. As the bird struck him he clapped his hand over his face, and, on withdrawing it, saw his palm covered with blood.

He shouted in terror, "I am shot." When I directed his attention to the feathers sticking to his hand, he became reassured and said it was "almost as surprising for you to kill a bird on the wing as for me to be shot."

The next season I saw only a single pigeon, but, like the rest of the local hunters, believed that for some unforeseen reason the birds had gone elsewhere and would return the following year. So far as I am

aware, not another pigeon has been seen in this region since.

When the unfortunate history of this bird is studied, it is not difficult to understand that, apart from any sudden overwhelming calamity, it was doomed because it was a migrant. The rule in each State was to have an open season when these migrants were present and a closed season, if any, after they had gone. Such regulation resulted, of course, in the bird's being subjected to continuous shooting throughout the year.

In 1857 the Ohio Legislature enacted a law protecting local game birds, and the committee report gave the following reasons for not including the wild pigeon:

"The passenger pigeon needs no protection. Wonderfully prolific, having the vast forests of the north as its breeding grounds, traveling hundreds of miles in search of food, it is here today and elsewhere tomorrow, and no ordinary destruction can lessen them or be missed from the myriads that are yearly produced."

An epidemic or some convulsion of the elements, such as an offshore gale, with the clouds raining down heavy hailstones, may have accounted for the sudden disappearance of the passenger pigeon, but from information available one can only guess as to the immediate cause that brought about its untimely end.

The fact that migrant game birds, above all others, needed protection was not understood until early in the present century, when a Federal migratory bird bill introduced in Congress by the author drew attention to the subject. After its enactment it was followed by a treaty with Great Britain, and legislation that placed migratory birds in the United States and Canada under the jurisdiction of the Federal governments and made possible throughout these regions the adjustment of open seasons consistent with the needs of the birds.

NOTES ON THE WILD PIGEON

Now that the passenger pigeon is a thing of the past, it is important to record definitely anything bearing upon its characteristics. I do not recall seeing in published form anything dealing with the notes of the wild pigeon.

Most of us are familiar, especially in the spring, with the two or three low, soft notes of the mourning dove, and are perhaps more familiar with the louder expressions of the



PATIENCE REWARDS A HUNGRY FLOCK

On the return of fishermen, the refuse part of their catch is deposited on shore for the expectant gulls, the State law requiring that no portions of the discarded fish be thrown into the lake. The birds in the above picture are all in adult plumage, the young of the year not having arrived.

domestic pigeon. That bird not only cooes vigorously, but the male when courting its mate has the habit of spreading its tail and wings, inflating its pouch while it prances about in a semicircle uttering notes like "chick-a-coo, wak-wak, chick-a-coo, wak-wak."

I never heard a wild pigeon utter a sound other than a long drawn, high-pitched, and rather rasping nasal note very unlike any utterance of the mourning dove and of such a peculiar character that I am unable to express it in type. This note I have heard on still days fully 200 yards away. Never having visited any nesting colonies of these birds in the late spring, I am not prepared to say that the wild pigeon had no other note during the mating period.

THE GREAT BLUE HERON

Temperate America has many kinds of herons, which vary greatly in size. Their common habit of wading in open shallow water while seeking their aquatic prey renders them more conspicuous than most other water birds. The great blue heron, one of the larger species of the tribe, is the only one that finds conditions to its liking in the waters of the Lake Superior region.

Its size and great spread of wing give it a striking appearance, whether it is stalking

its prey in the shallows, standing along the shores of woodland waters, or flying over with long extended legs and slow majestic wing beats. It rarely alights along the shore of Lake Superior, but occasionally is seen there passing from the mouth of one stream to that of another.

Although the most widely distributed species of heron in North America, this bird is never so numerous nor so gregarious as some of its smaller relatives. In the Lake Superior region I have rarely seen more than a pair of great blue herons with their young of the season about any of the small lakes, and these are usually solitary in habits.

Once in August a pair of these birds brought two young of the year into their fishing territory about Whitefish Lake. On a fishing trip one day I saw all four of them distributed singly in the manner of their kind. One was at each end of the lake, another was on Whitefish River above camp, and the fourth was watching for speckled trout in a pool at the foot of some falls, up a tributary of the lake. The dexterity of this bird was surprising as it seized the trout in the swirling, foam-covered pool where several dozen of them had congregated with the vain hope of surmounting the falls.



HERRING GULLS AWAIT THEIR DOLE IN MARQUETTE HARBOR

In the afternoon they gather from far and near to await the arrival of the fish tugs with their catch of fish.



SOME GULLS TAKE TO THE HOUSE TOPS

Perhaps these go aloft to watch for signs of approaching fishing boats and the feast they will bring.

On one occasion, however, I saw eight of these herons assembled at a little lake on Grand Island. An investigation showed that they were feeding on tadpoles, which swarmed along the shore of the lake. As I approached they departed, each in a different direction.

No doubt it is a common practice of these widely spaced birds in many of the northern parts of their range to nest by themselves, but where conditions are more favorable, especially farther south, they often breed in colonies, sometimes composed entirely of their kind, and at other times associated with other herons in great rookeries. Still farther south they even fraternize with very different birds and may share breeding places with cormorants and brown pelicans.

In northern Michigan, as in many other places, the great blue heron nests in the tops of tall trees. Elsewhere, in great marshes or on barren islands, they not infrequently build nests of reeds and grasses on the ground. These choices of nesting sites, varying to meet local conditions, seem due to a mental adaptability that might be attributed to reasoning powers.

Blue herons sometimes seek roosting places with varying numbers of their fellows, but commonly pass the night standing solitary by the water where they hunt by day. The smaller herons such as the American, snowy and reddish egrets, the little blue and the Louisiana usually have regular roosts where they gather often in a mixed company numbering many hundreds and sometimes several thousand.

THE HERRING GULL ON LAKE SUPERIOR

Of about 20 kinds of gulls inhabiting North America, the herring gull, a species of wide distribution, is the only one that makes its home in this region. Its snowy white head and body, pearl gray back, jet black wing tips, and yellow bill, combined with the grace of its flight, render it a strikingly beautiful occupant of these waters, otherwise so poor in bird life. It arrives along the shores of the great lake as soon as the ice breaks up in spring, and many remain until driven away by the closing in of the ice along shore in December. At times, however, a few remain all winter about open water in the lake.

The herring gull nests in considerable numbers on rocky islets, and at times on the face of cliffs in places not accessible to predatory animals. The nest, on top of a

rock or a jutting shelf, is crudely built of a few sticks and other small fragments of vegetable matter, enough to hold the eggs. These, usually two in number, are laid during the last half of May or early in June. They are a dull olive-green, spotted and blotched with chocolate brown. In other regions, where they are much molested, they build a more elaborate nest in the tops of trees, sometimes 50 feet or so from the ground.

HERRING GULLS DEVELOP FAST

When hatched, the young are covered with a fluffy coat of light brown down, sprinkled with dark spots. They quickly develop an alert intelligence, and if approached within a day or so after leaving the shell either will lie flat with head outstretched, if in a bare spot, or will run to the nearest vegetation for concealment, if cover is near. Within two weeks they voluntarily leave their rocky birthplaces on islands and swim away if one draws near, but quickly return when the danger passes.

During my early days on the shore of Lake Superior the lake herring existed in enormous numbers, and these with other fish provided an easy living for the gulls. As the whitefish and lake trout decreased from overfishing to a point that caused many fishermen to abandon their occupation, the others turned much of their attention to this less desirable fish until it also rapidly diminished in numbers.

With the lessening fish supply herring gulls have also become fewer about Lake Superior, and of late years those remaining congregate more and more about harbors, where they act as scavengers for lake steamers, and especially about fish wharves where the fishermen bring and clean their catches.

Mixed with the pure white old gulls at such places in summer and fall may be seen numerous dark brownish birds of the same size. These are the young birds, which require two or three years to develop the resplendent coat of their parents. Herring gulls occasionally make excursions to the larger warm lakes inland from Lake Superior, but apparently find nothing to hold them there for any but the briefest visits. They frequent Georgian Bay in considerable numbers and also the large lakes to the northward in Ontario.

I first pictured the herring gull many years ago on some of the massive domes of quartzite projecting well above the level



YOUNG HERRING GULLS ARE NOISY IN ACTION

When offal is cut into the water from the wharves for pictures, the young gulls fight fiercely for it, often screaming shrilly in anger and excitement. The dark color of the young makes them readily distinguishable from the beautifully white and pearl gray adults.

of the lake, a mile or more from shore. These rocky islets, with flattened or broken surfaces, afford secure and favorable breeding places. In sequence the camera shows the nests, the eggs, the downy young, and the robust, speckled fledglings in their secluded nursery home, over which the parent birds circle high, protesting against the intruders.

A RECORD OF GULL LIFE

After the lapse of many years, I completed the pictorial history of this species by showing hundreds of adult birds within the town harbor.

The clear, deep, cold water of this great lake hinders insect or plant life, so that the broad sand beaches and the many sheltered bays are barren of aquatic birds. There are no wild fowl except a few fish-eating mergansers and the wary loon, and no flocks of shore birds, such as the sanderling, snipe, and plover are to be seen. The stately waders, such as the blue heron, can be found only in marshlands beyond the lake.

The herring gull of Lake Superior is the sole but finest representative of a very numerous family and should be prized by citizens and visitors alike. Here all day long they sail overhead in azure skies or rest in regimented array on the quiet waters, besides frequently ornamenting, in long, white rows, the dingy docks, discolored by hematite ores or the grimy

dust from piles of coal brought from eastern mines.

In the fall, during the spawning season, the local fishermen are temporarily without an occupation, and, therefore, are unable to furnish the customary food to their dependent boarders. At such times, these winged supplicants should be aided by the considerate inhabitants of the town.

Were the gulls fed regularly at a given spot they would be a welcome sight to all who find pleasure in an attractive sojourner which graces the skies, the shores, and the waters of this great inland sea, practically devoid of all other aquatic birds.

CHAPTER V

Wild Animals About Whitefish Lake Camp

TO MANY forms of wild life a clearing in the wilderness becomes a real oasis which they love to frequent both by day and by night.

In such places the absence of trees permits the sun to warm the soil, producing shrubbery and other ground vegetation bearing seeds and small fruits, with a multitude of insects not available in the forest. With the more harmless kinds of animals, come also birds and beasts of prey to feed upon their defenseless neighbors.

STUDIES IN ANIMAL PSYCHOLOGY

The smaller and less timid animals come at night about cabins at such places and about country homes, especially where thickets or other shelter is available. The tenacity with which wild animals persist where such cover occurs, even in the midst of encroaching civilization, is frequently a source of surprise to me. These instances offer an interesting study in the resourcefulness and adaptability of wild creatures, which must needs exert all their reasoning powers as well as instincts to survive.

For nearly thirty years we occupied Whitefish Lake Camp only during the fishing and hunting seasons, leaving it unused for intermittent long periods. Whenever we returned, we always found varied evidence of many woodland visitors.

In a sunny spot would be the daily dusting places of the grouse. Everywhere were the hoofprints of deer, and occasionally were seen the doglike tracks of a skulking wolf, unafraid of a hunter's cabin when the fresh trail of a deer gave assurance of a long-absent owner.

The door sills and pork barrels had been gnawed by the salt-seeking porcupine; the broken branches of a mountain ash indicated where Bruin had leisurely pulled down red clusters of frost-sweetened berries; and the tender saplings had been girdled by the varying hare. Clover and dandelions had been cropped close by bulky woodchucks. There was the pungent odor of a skunk beneath the cabin floor, and on the sand bars of the creek flowing through the camp opening were the tracks of the great blue heron, mink, muskrat, and beaver.

Perhaps the first night after our return we would hear a chorus of indignant owls aroused by the glare of the camp fire, or the startled snort of an approaching deer. Then all would change, for the circling smoke, the heavy blows of the ax upon the hardwood logs, human voices, and the tell-tale scent gave distant warning of the enemy's return.

Except for the twittering of the chipmunks, the tattoo of the woodpeckers, and the flight of cedar birds and blue jays across the clearing, or the scampering of white-footed mice upon the cabin floor, all indications of bird and animal life would soon disappear temporarily.

The difference between the time when there was neither a habitation nor a railroad within 20 miles of this locality, and that period when a permanent camp was built and a caretaker was continuously in charge affords one of the most interesting chapters in animal psychology within the writer's experience.

It might well be supposed that the denizens of the forest would cease their visits when the place was occupied by day and night, with all the noise and bustle of a woodland home, for the chorus of barnyard fowls, the neighing of horses, the lowing and the tinkling bells of browsing cattle, the chug of an engine filling the house tank, and the glittering lights seen afar each night gave ample notice to every living thing that man had invaded their domain and was abiding therein.

A RENDEZVOUS FOR FOREST FOLK

The deer soon learned that their ancient enemy preferred a camera to the gun, and, freed from the terror of prowling wolves, took possession of near-by swamps and thickets. The grouse, noting that the fox and lynx were equally cautious, nested contentedly at the edge of the clearing. Robins, safe from hawks and owls, built numerous nests in the scattered balsams, finding about the place an abundance of angleworms and berries for their clamorous broods.

The night-loving hare nibbled on the clover beneath the midday sun (see page 141); muskrats made trails straight from



THE CAMP GARDEN WAS POPULAR WITH EVERYBODY

The strawberry patch in front of the old log cabin was thriving until it was discovered and nearly destroyed by deer at night. The surroundings were the scene of many activities of the wild neighbors described in this chapter.



RED SQUIRRELS COME TO THE CORN PATCH

This raider is making free with the roasting ears in the camp garden. If the author had gone in for truck growing seriously, he would have been obliged to surround all his property with fine mesh screens, for his wild neighbors were no respecters of owner's rights.



A BLUE-HAIRED PORCUPINE IS A RARITY

At the border of the camp clearing one day the author photographed this odd creature, the only one of the color he ever saw, though he found a coal black specimen once in Ontario. It started up a tree, but when he gave the moaning grunt of the tribe it stopped at once (see text, page 140).



RED SQUIRRELS ARE SAUCY FELLOWS

Here one is photographed in an attitude of pert inquiry as it crosses the bridge to camp. It is making for the corn patch, where it knows a delicious feast awaits it (see illustration, page 131).



TINY VISITORS ARE NUMEROUS

The white-footed mouse shown above is common in the woods of northern Michigan and makes free use of camps in its haunts, though it is not so destructive a raider as its neighbor, the squirrel.



THE CAMP CAT HAD SEVEN TOES ON EACH FOOT

It had an abiding fondness for the frogs it caught about the water garden. At its appearance there was consternation among the birds and small animals. Some of the author's feathered friends even changed the nesting habits of their species to outwit their predatory foe.



SALAMANDERS LIKE SLUGGISH WATER

Their oddly shaped eggs show the young lying half coiled in the lower part of the transparent sacs attached to the submerged underpart of a flat rock.

the creek to the nearest carrot patch; porcupines chiseled the tender bark of many a sapling; and once a beaver gnawed a half-grown ash by the boathouse and retreated only when the flashlight recorded his midnight visit (see page 141).

Raccoons knew when the corn was tender, and again the flashlight saved the crop; skunks dug holes beneath the floor, and now and then picked up a belated fowl; a mink, grown tired of a diet of fish, took heavy toll of the snow-white domestic ducks at the swimming pool (see page 143); chipmunks found little potatoes just the things for carrying off; cherry birds gladly changed from the wild to domestic fruit; and all day long woodpeckers, nuthatches, cat-birds, and jays picked at the suet hung conveniently near.

Humming birds and butterflies flitted among the flowers, beneath which sat little green frogs sure of a meal (see page 137); the blue heron stalked at the edge of the stream (see page 119); and no bird or animal ever had reason to regret a camp wedged in the mighty forest, except those seeking the lives of harmless creatures.

The most interesting as well as the most destructive visitors were the deer; for as the gradually enlarging garden offered a greater variety of vegetables and small fruits the temptation proved irresistible to them. When the garden patch was simple, and unguarded before the hunting season,



NEAR CAMP WAS A SALAMANDER HAUNT

These creatures inhabit sluggish water, which provides them with bountiful repasts. Their eggs are attached to rocks (see the other picture on this page).

the bucks were active in these forays; but few came later, the call of the mating season sometimes inducing an antlered escort to jump the fence over which had already gone his less timorous partner.

THE DEER'S FAVORITE VEGETABLES

Does, fawns, and yearlings, totaling some seasons more than a dozen, each night or so registered their presence and respective ages by the clear-cut hoof prints in the garden soil. Rarely did one come before midnight and seldom were any seen in the vicinity during the day. During a decade I kept a record of the vegetables and fruits most preferred by deer, with a notation whenever there was a marked departure in any season by groups or individuals.

Not until the fawns were free to follow their mothers and the garden offered the first of the ripening crops would there be a visit by deer. About the middle of July the wild raspberry bushes close by the fence would show some of the newer growth clipped by sharp teeth. A few days later, when the darkened windows gave assurance that the occupants of the camp had retired, the vegetable patches close by the cabins would be visited.

In the order of preference by deer, to some extent determined by the time of growth, came the red cabbage, the best loved of all, then carrot and beet tops, lettuce, new shoots of domestic raspberries,



A DOE AND TWIN FAWNS IN THE GRAY COAT FEAST ON MOUNTAIN ASH BERRIES

The lure was placed so that when deer, on their way to the garden, stopped to feed on them they exploded the flashlight and photographed themselves with the boathouse in the background. Note the large size of the Michigan fawns in the fall.



STARTLED, THEY PAUSE TO INVESTIGATE

In this instance the deer in the camp garden were disturbed by the click of the hammer, but the flashlight hung fire long enough for them to poise in an attitude of alarm ready to take flight. The tense alertness of the larger animal is well indicated by its attitude and facial expression.

white clover, peas, Brussels sprouts, and white cabbage.

No deer ever touched the leaves or products of the potato plant, tomatoes, squash, rhubarb, corn, cucumbers, asparagus, onions, or parsnips, the immunity of the latter being inexplicable. Some seasons the deer's attention was almost entirely devoted to the strawberry plants, and the following year it might be that not a leaf or a tender runner of the plant would be touched.

FLASHLIGHT GIVES PAUSE TO MARAUDERS

In the endeavor to save the cabbages, we always planted them within a few feet of the caretaker's bedroom; but often in the morning a gaping hole in the center of a head showed that the deer considered their choicest morsel a prize that warranted taking a chance.

Partly to save the crops and, in my own case, more to record the presence of the deer, flashlights and cameras were put in different parts of the garden, with a cabin or some camp building as background when possible. More than 50 such pictures have been taken, a few of which accompany this article. The heavy report and dazzling glare terrified each marauder for a week or two, and then, made eager by hunger and led by less timid fawns, they returned to the feast, and on moonlight nights their shadowy forms might be seen moving noiselessly from place to place.

As another means of saving a part of the crops intended for winter use, we placed



SKUNKS SOMETIMES VISIT THE CORN PATCH

When one fired a flashlight set for a raccoon, the author learned that these creatures sometimes eat or investigate roasting ears.

each when it matured in the root house, except on one occasion the parsnips, which, never having been molested, we left in the ground, well covered with four or five feet of snow. It was the intention to dig them early in the spring, at which time they would be better and sweeter than if placed in the root house.

MUSKRATS MAKE A FORAY ON PARSNIPS

As the deep snow began melting in spring, a hole was dug down to the soil for a first meal of parsnips. Not one of them remained, but in their place was a neat tunnel with branches leading 200 feet to the water, made by muskrats. This showed very plainly the habits of these animals in



WOODCHUCKS ALSO FOUND TEMPTING PLANTS IN THE GARDEN



A DOZEN FROGS CATCH NEARLY A THOUSAND BUTTERFLIES

Early in August, 1919, the six leopard frogs living in the camp water garden near Whitefish Lake were seen preying on "the little white-banded blues."



THERE WERE UNWELCOME NEIGHBORS AT THE DARK ROOM

A pair of skunks burrowed under the camp laboratory. Their picture was developed while they could be heard beneath the floor, where they took refuge, to the author's discomfiture, after the flashlight exploded. The one to the right is shown pulling on the baited string that led to the flashlight apparatus.

venturing far from the watercourses beneath the deep snows, led by an acute sense of smell in search of green food untouched by frosts or zero weather.

The red squirrel, or chick-a-ree, so characteristic of northern coniferous forests, was one of our few rodents seen by daylight. Its presence added much to the cheerfulness of the mixed pine and hemlock woods. It is the most confident and familiar of all the squirrels, and appears to get much enjoyment from sitting on a low branch or clinging to the bark, low on the trunk of a tree, while it barks and chatters at a human intruder in its haunts. Like the snowshoe rabbit, it becomes very abundant at times, after which it is swept away by an epizootic disease until only a few remain.

SQUIRRELS DISCOVER A TASTE FOR GREEN CORN

The chattering of these little reddish creatures may be heard almost daily at the camp where at all hours of the day could be seen the two kinds of chipmunks. One fall a red squirrel discovered that young corn was to its taste, and others of its kind joined it in making free use of the corn patch. Aside from such excursions, these squirrels usually kept within the borders of their forest home.

For many years red squirrels were common in the residential part of Marquette, where the many trees offered them safe refuge and home sites, while the fences, which surrounded the house lots, afforded convenient highways for their excursions from place to place when they were seeking food. The fences also provided them safe routes of escape when pursued by dogs and small boys.

In fact, such harrying appeared to afford the squirrels some pleasurable excitement,

for they would run on a fence top to a neighboring tree, where they would take refuge on the trunk near the lower branches. From this point of vantage they would chatter, scold, and utter explosive barks, scurrying about and giving evidence that if their language could be translated it would not be appreciated in polite society.

RED SQUIRRELS DESERT MARQUETTE

About 1910 I noted that these squirrels had disappeared from the town, although they were still common in the surrounding woods. The explanation seems to be that shortly before that time the residents removed the fences in order to give the town a more parklike and attractive appearance. This act at once deprived the squirrels of their only safe route of travel in the midst of constant danger. It may be added that red squirrels are more completely tree animals than many others, and rarely leave their forest haunts except by highways afforded by fences. Along such routes, however, adventurous individuals sometimes go long distances through treeless fields to groups of farm buildings, where they raid granaries and other stores.

I never saw a flying squirrel about the clearing at camp, probably because of their nocturnal habits. Their presence in the neighborhood during one summer was



BUTTERFLIES SEEK VARIED FARE!

Above is shown a swarm of little white-banded blues feasting on the juices of a dead pickerel.
A group of another species clustered near by on milkweed flowers (see page 140).



A TOAD SHOWS INTELLIGENCE

Several nights in succession, when the author set the jacklight on the bank of the river, a toad hopped briskly out from the surrounding darkness and made a hearty repast on the insects attracted by the light (see text, page 141).



RACCOONS WERE THE MOST DESTRUCTIVE INVADERS OF THE CAMP CORN PATCH

In the course of three nights in August, 1912, they took nearly all of the crop. Only the muskrats were greedier than these fellows. Both species soon became indifferent to the harmless explosions of the flashlights. In the above photograph the cord and stick of the photographic device can be seen plainly. The animal is using his paws to hold the bait to his mouth.

shown by the cat at different times leaving about half a dozen of their fluffy tails by the doorstep. The lumbermen found them and their nests in hollows of fallen trees often enough to indicate that this little aerial traveler was fairly common.

An occasional gray squirrel has been seen in a small oak forest three miles west of camp, and twice I saw black representatives of this animal a little farther to the west. Because of some unfavorable factors, perhaps the proverbial enmity of the red squirrel, the uncertainty of crops of acorns and beechnuts, or whatever it might be, these squirrels were never seen anywhere nearer camp.

As indicating how readily some forest growths may be established, I recall one season when three or four itinerant gray squirrels appeared in the grounds about my home in Marquette where several large oak

trees often produced a big crop of acorns. On this occasion the squirrels planted acorns under the surface of the lawn and the next spring several hundred young oaks clogged the lawn mower. The Boy Scouts and other youthful organizations, following the example of the squirrels but under more intelligent direction, can be of untold helpfulness in reestablishing oaks and other beautiful forests trees on suitable vacant lands.

TWO KINDS OF CHIPMUNKS

The chipmunks were the handsomest and among the most interesting small animals about Whitefish Lake Camp. Two distinct kinds, or species, of these small beasts found there a happy hunting ground. One of them is the westernmost representative of the well-known chipmunk of the New England and other eastern States. This local



SOME BUTTERFLIES LIKE MILKWEED FLOWERS

Different species have different appetites, the author learned (see, also, illustrations, pages 137 and 138).

form is a geographic race known as the Lyster chipmunk bearing the scientific name of *Tamias striatus lysteri*.

The other, known as the Lake Superior chipmunk, or *Eutamias minimus jacksoni*, is of a geographic race peculiar to this region and the easternmost representative of a species that occupies much of the northern Great Plains and the Rocky Mountain region of the United States and far north in Canada. Both of these vivacious little animals are brightly striped along the back and have very similar habits.

Chipmunks were common and became very tame, constantly sharing the food put out for birds, and coming freely about our feet on the porch for scattered grain or bread crumbs. One season, probably during

a scarcity of other food, they raided the potato patch and dug up large numbers of the young tubers, the size of marbles, which they carried away to their hidden stores. On other occasions they stripped the camp cherry tree of ripening fruit, carefully taking off the fleshy pulp, which was left scattered on the ground, while the small marauders carried away the stones.

Once I heard a robin uttering cries of alarm and looked from a window just in time to see the bird drive a chipmunk out of its nest. This suspicious happening raised some doubt in my mind as to whether these pretty creatures might or might not share the carnivorous habits of their relatives, the red and the gray squirrels. It is well known that at times the squirrels named

become a dangerous menace to birds by destroying the young in the nests.

A BLUE-HAIRED PORCUPINE CALLS

One afternoon a large bluish-haired porcupine was found waddling along close to a large maple tree at the edge of the camp clearing. Camera in hand, as the animal began ascending the tree trunk, I imitated the crooning note of contentment these animals utter at times. The climber stopped at once, about six feet from the ground, and was photographed (see illustration, page 131). The ordinary porcupine, in its usual dress, was a familiar neighbor.

One night near camp a camera was focused pointing down into a pool that usually contained fish. A flashlight was



A BEAVER CUT A BLACK ASH BY THE CAMP BOATHOUSE

When the author found evidence of the animal's presence, he set a flashlight camera, and the next night this big old fellow photographed himself (see text, page 133).

fired and a fine picture was obtained of about a dozen swimming trout. Such a picture could not have been taken by day, for the light reflected from the surface of the pool would have prevented. In very clear water, however, if the surface is shaded from direct sunlight, successful pictures can be taken by day, when the bottom of the pool is light colored.

A WISE TOAD USES HIS HEAD

While preparing the canoe for a trip from camp after flashlight pictures, we were accustomed to place the lighted jack on the bank to illuminate the canoe so that the cameras and other equipment could be put into place. One night we saw a large toad suddenly hop out upon the well-lighted ground between the jack and the canoe, where many insects were attracted by the light (see illustration, page 138).

The toad captured many of the insects on its first appearance, and evidently recognized the cause of the bountiful harvest provided in this manner. It repeated the performance on successive nights and thus proved its ability to take prompt advantage of an unusual opportunity.



A VARYING HARE MAKES A DAYTIME VISIT

These creatures usually hide in thickets in swamps by day, but the white clover at camp drew them there. This one is in the full brown summer coat. In winter they are white.



THIS WAS THE FIRST MINK TO TAKE ITS OWN PICTURE AT CAMP

A fish on the end of the cord leading to the flashlight enabled the animal to photograph itself. Wary and sly at all times, these swift creatures were not often subjects for the camera. They were villains among the poultry, however (see illustration on opposite page).



ONE MARAUDER IS ACTIVE BOTH DAY AND NIGHT

This flashlight pictures a mink which for several days in succession raided a little flock of white ducks in the swimming pool at camp.

As might be expected in one of the more northerly sections of the country snakes were seldom seen about camp. Once in every two or three years a garter snake would be noticed sunning itself in an open space in front of a cabin and at other times might be seen trying to capture a frog in the water garden. The long winters and deep snows evidently discourage this form of reptilian life.

AN AMAZING COINCIDENCE

About 1880, when paddling by a low flat rock that extended out about 75 feet from the eastern shore of Whitefish Lake, I saw a good-sized brown-colored snake coiled up near the edge of the water. It bore a close resemblance to the water snake that I had so frequently seen in creeks flowing into the head waters of the Ohio River.

When I was within a few yards of this rare visitor, it glided into the water and disappeared, never to be seen by us again.

In commemoration of this event the locality was named "snake rock," showing how easily some transient incident may account for odd names of localities large or small. It was the marked absence of snakes that probably accounted for the following entry in my note book, November 10, 1894:

"During the last week we occupied Colonel Howe's log cabin east of Whitefish Lake. The first night was cold and blustering, so we welcomed the glow of the sheet-iron stove. By chance the subject of snakes was mentioned, and I asked one of my companions, who was sitting on the only bed with a mattress, if he liked snakes:

"No," he answered, "I hate them worse than grizzly bears."

"Then," I said calmly, "Why are you sitting on two of them?"

Springing from the bed he demanded in a quavering voice what I meant. To continue my joke, I told him to turn back the upper mattress and he would learn. When



VISITING THE CARROT PATCH

This doe selected its favorite vegetable within ten feet of the cabin containing the dining room, wherein many a haunch of venison has been served in the hunting season. At no time are these visitors seen in or about the garden in daylight, but almost invariably after midnight.



FINISHING UP THE BRUSSELS SPROUTS

This deer took its picture at midnight before the cottage of the caretaker, whose sleep was doubtless momentarily disturbed by the explosion. But since such raids were a continual strain on the temper of the gardener, he always welcomed the sound.



THE LYSSTER HANGS ABOUT CAMP

This type of small chipmunk is familiar to all who go into wooded places in the northeastern parts of the United States and eastern Canada. The creatures have the habit of filling their cheeks with food to carry to their hidden stores. The swollen pouch may be noted in this picture.



THE LAKE SUPERIOR CHIPMUNK IS PERT

This is the eastern representative of a small, slender species which in one race or another occurs in many parts of the Far West. Though heavier bodied and less finely striped than its cousin, it has similar habits. Both soon become confident concerning their human neighbors.



A PORCUPINE INVADES THE HOUSE BOAT

One night, on returning from a flashlight camera hunt for deer, the author and his companions were surprised to find a porcupine on the house boat eating salted butter from a glass container. As the marauder started toward the gang plank, a flashlight explosion hastened his departure. Notice how the light illuminates the underpart of the body.



RED SQUIRRELS PLAY ABOUT CAMP

Although these little forest dwellers rarely came near the buildings except to raid the corn patch, they now and then explored the clearing for what they might find. Here one is caught as he prepared to try the food put out for birds.

this was done, to my surprise as well as to his horror we saw two large garter snakes lying coiled in a state of torpor from the cold. They were promptly dispatched with an iron piker, and for the rest of our stay I became the sole occupant of this double bed.

In explanation it should be said that when my remark had been made I had in

mind the story of a hunter who had occupied this cabin for a time some years before. He related that during his first night he felt something under him move and on turning back the bedding found a large snake, perhaps one of the progenitors of those we killed. On the strength of this story I made the idle prediction that was so amazingly verified.



CHAPTER VI

Three Expeditions to the Wanapitei District in Ontario

EASTERLY from the north shore of Lake Superior and north of Georgian Bay, Ontario, is a large and well-forested area filled with numberless lakes and streams and frequented by many big-game animals. There I took the first flashlight picture ever made of a moose.

The location and the characteristics of this region as well as the chronological sequence of my photographic adventures there, place the account of this area in close relationship to my experiences around Lake Superior.

A TRIP TO MOOSE COUNTRY

For a number of years I had heard that moose were abundant north of Lake Huron, and greatly desiring to get pictures of this fine game animal, I selected, after many inquiries, the section north of Georgian Bay as the scene of my efforts.

About the middle of July, 1902, with my guide, John Hammer, I arrived at Wanapitei station on the Canadian Pacific Railway, adjacent to a river of the same name that flows from the country to the north we were about to explore. Leaving the train in the evening, we went to a ramshackle hotel filled with lumber-jacks, who were intent on celebrating the week-end after the manner of these sons of the woods.

It was important to get a local guide, or at least some one familiar with the chain of lakes we had located on the map as a desirable objective. A well-filled barroom seemed likely to contain the man we were after. As a stranger I established a friendly atmosphere by setting up a round or two of drinks for all, and then made known my desire. With remarkable unanimity these wielders of the ax said that Joe Decaire was the best man I could get, for he had trapped and hunted all his life in that part of the country.

When Joe was produced, he proved to be a stocky, well-built halfbreed French-Canadian whose appearance pleased me, and I explained the object of the trip. He agreed to go. After looking over our canoe, he insisted that we needed an additional one. Since he weighed more than two hundred pounds, his suggestion seemed to be justified. Joe added that we ought to take a

second guide, because some of the portages were very steep and a second man would save time in paddling and packing.

To both proposals I assented. My purpose on this trip was to look the country over rather hastily. If I were not successful in getting the photographs desired, and if the prospects were good, I would return the following year.

Each morning lumber teams with supplies left the station for Lake Wanapitei, 14 miles to the north. A teamster agreed to take our canoes and camp outfit while we trudged along behind. The walk took us through a lumbered and burned-over district where moose were seldom seen, but deer, rabbits, and grouse were abundant.

On the way we were joined by the second guide, a dapper hanger-on of the lumber camps, whom Joe said we would find "good company." Just what this meant it was hard to interpret. For the sake of anonymity we shall call the newcomer "Billy."

BILLY HAD HARSH CRITICS

We reached the lake about noon and went aboard a small tug bound for its north end. While we were putting our outfit on board, matters were enlivened by the cook of a near-by boarding house chasing Billy about the dock brandishing a large carving knife. The irate cook declared he had been robbed of his last month's wages through knockout drops administered by my assistant guide, and he wanted revenge. Stowing Billy away in the pilot house, we helped put the rest of the outfit on board.

The trip across Lake Wanapitei was not particularly interesting. The lake is a large, rounded body of water of unusual depth, but all the forests on its shores had been cut. It was not until we came to the forest reserve, through part of which we were to canoe, that unspoiled forests once more surrounded us.

Our first landing was at the Crystal Mine, from which we were to portage to a chain of lakes to the northeast. Here the caretaker of the abandoned mine took me to one side and asked why I had hired Billy.

"That fellow," he continued, "stuck me for six months' board and when you bring



HERRING GULLS STRAYED FROM USUAL
HAUNTS

On Gull Lake the author found a large family of these birds, evidently seasonal visitors from Lake Huron.

him back I am going to beat the life out of him." It is scarcely necessary to state that we returned by a different route.

Launching our canoes on Lake Matamagasi, we crossed to its northeastern arm and thence continued on to Loon and McDonald Lakes. On the way Billy regaled us with French-Canadian songs, and when I expressed fear that he would drive all the moose out of the country he smilingly retorted, "Why, the only two moose we have seen so far were frightened out of their sleep and so you had a chance to see them running away."

We paused for the night on the shore of Loon Lake, and, after the tents were up, saw several deer on the opposite shore. A cow moose appeared there toward sundown. I decided not to disturb them then, since the light was getting too weak for a daylight picture, and it would be easier to approach them after dark.

At dusk the larger canoe was made ready and we prepared to start out on a camera hunt. Joe, who had a somewhat hazy idea of how flashlight pictures were taken, asked to be permitted to go along. Because his substantial weight would make good ballast to steady the canoe, his request was granted. After nearly circling the lake without seeing or hearing any animal, I directed attention to the brightening of the sky in the east, saying that the moon would be up by the

time we reached camp. The canoe was turned in that direction.

About 300 yards from camp, as the canoe glided silently along, I heard a slight rustling in the bushes at the head of a small cove. When this noise ceased, a pair of greenish yellow eyes appeared glowing brightly near the edge of the water. I knew it was neither a moose nor a deer; just what it was I could not determine.

Approaching closer, we saw an erect, cat-like figure sitting on its haunches, eyeing the jacklight with curiosity rather than concern. At a distance of 25 feet I raised the flashlight overhead and, as usual, closing one eye, fired it. Instantly opening the eye unaffected by the brilliant light, I saw the animal leap high in the air. As it struck the ground, it gave a piercing cry.

At this moment my attention was attracted by unexpected happenings behind me, for the canoe gave a tremendous lurch to the right and took in considerable water. Turning the jacklight so that I could see the length of the boat, I saw Joe stretched full length on his back rubbing his eyes. John explained that when I was about to fire the flash Joe had stood up in a crouching position to see what was going on, his face being only about six inches from the flashlight apparatus. When the light exploded almost in his face, he fell backward.

A LYNX FLASHLIGHT CAUSES PANIC

I asked Joe if he was hurt and if he could see, and he answered that he could see "about a thousand stars."

Much to my relief, beyond having his hair singed, he was uninjured. I then asked him whether the animal we had seen was a wild cat or a lynx.

"It was no wild cat," he replied, "for we don't have them around here."

"Then it was a lynx," I said.

"No, it wasn't a lynx," he replied.

"But it must have been," I insisted.

"Well," said Joe, "it couldn't be a lynx, because I never heard one give a howl like that."

Thereupon I explained that this was the first time the lynx had had any experience with a flashlight. Its language was not to be measured in an ordinary way, any more than were his own actions in nearly capsizing the canoe.

Just as the bow of the canoe grated on the sand beach in front of the tents, we

saw the silvery edge of the moon showing through the tree tops. The picture had been taken none too soon, for once above the horizon the rays of the moon would have disclosed the approaching canoe to any keen-eyed prowler of the night. Until day-break excited talk went on in the adjoining tent, where the recent adventure was being detailed by voice and action.

The following day we turned back, and I arranged with Joe for another trip to this section the next season, but without the light-fingered vocalist. In justice to Billy, it must be said he proved a cheerful and energetic camp assistant, whose ingratiating ways had doubtless led to the easy fleec-



PIED-BILLED GREBES SWIM GRACIOUSLY ON THE MIRRORLIKE WATERS OF LAKE MATAMAGASI

ing of his unwary comrades of the forest.

A week later the negative was developed, and there in the center of the plate was the figure of a large Canada lynx, its reflection showing in the water (see page 150).

My first visit to this area had revealed



A LOON CHERISHED A SINGLE EGG AT LOON LAKE

This nest was on a brush-grown point of an islet in the lake, well screened from view except on the open front to the water, about three feet away.



A CANADA LYNX ON THE SHORE OF LOON LAKE, ONTARIO, WAS FEARLESS

Sitting erect, this handsome cat eyed the jacklight on the canoe with undisturbed curiosity (see page 148). The exploding flashlight caused consternation aboard the boat as well as on shore. It was the only night picture obtained by the author during his first trip to the Wanapitei district.

the excellent opportunities it afforded to the wild-life photographer, and plans had been made for a second expedition. On July 21, 1903, accompanied by my friend, Edwin Z. Smith, and the guide, John Hammer, I left Marquette, equipped with fishing tackle and camera, but no guns, and arrived at Wanapitei station the same evening.

Joe was awaiting us in a condition plainly indicating that he had liquidated some of his future wages. The following morning a lumber wagon carried us to the south end of Lake Wanapitei in time for a start up the lake in two canoes. That night we camped at an old fisherman's cabin about halfway up the shore and enjoyed his quaint stories of earlier times.

On July 22 the canoes entered the long, narrow inlet leading to the Crystal Mine, where we paused overnight to get additional information about the country ahead. We planned to be gone about ten days and hoped to explore a number of little-known lakes and perhaps discover new ones.

THE ADVENTURERS' DIARIES

During this trip both my companion and I kept diaries, from which the following account is taken. It has seemed to me desirable to give the story of this trip in the form of a daily itinerary in order that the reader may have opportunity to visualize the activities of a fishing party, out also to obtain photographs of wild life in a wilderness area. Our little canoe voyage included visits to a series of beautiful small lakes hidden in a primitive wilderness.

July 23: In the early morning, after a good breakfast prepared by the wife of the caretaker at the mine, we portaged across a rocky ridge to Lake Matagamasi, an Indian name, meaning "Beginning of the River." Wanapitei is said to mean "Hollow Tooth," and was the name of an Indian who formerly lived there.

After a short carry we were soon paddling up this fine lake to some rapids at the head of its northwestern arm. Here our wading boots were used and we towed, pushed, and paddled through the swift current to a deserted camp known as "Mountain Mine." As we took temporary possession of a big empty building, two great horned owls flew out, apparently having used it as a convenient shelter.

After luncheon in an old storeroom we tried for fish in a pretty pool at the foot of the upper rapids, but caught only a few

small black bass. Then we located the trail to Wolf Lake and saw a covey of ruffed grouse in the bush, one of which we killed with a stone. Later we scanned the shore of the lake for moose, but the only signs of life were a few great blue herons perched on branches of dead trees near the water.

July 24: After John had given us a breakfast of bass, corn dodgers, and coffee, we made a portage in the hot sun over a steep, hard trail to Wolf Lake. This is a picturesque small lake, surrounded by high cliffs. A beautiful passage leads through narrows connecting the lower with the upper part of the lake. At 11 we made a short portage from the head of the lake to a small cove on the border of Dewdney Lake, where we found many bass, some of which we caught.

An easy portage took us to Lower Dewdney Lake, a most attractive body of water, dotted with islands and forming a beautiful scene, although it is less precipitous about its shores than is Wolf Lake. On our way through the narrows to Upper Dewdney Lake we stopped and had fine sport with some big fighting bass.

A bad portage at the end of the lake, in places over slippery rocks and steep grades through thick woods for half a mile, brought us to the lower end of Lake Chiniguchi. We had luncheon and photographed a big bullfrog, the only game today (see page 155).

MOOSE TRACKS PROMISE SPORT

Beyond this, an hour's paddling took us to a fine camping place on a narrow point, where we pitched our tents and made a good camp fire under the tall pines, although this being a forest reservation, axes were barred. Late in the evening, while a cool breeze was blowing and the stars looked extraordinarily large and bright, John and I went out in the canoe for moose pictures. I returned at midnight disappointed, but encouraged by the numerous moose tracks seen on the beaches.

July 25: Rain kept us under the tent until afternoon, when some fishing and camera hunting were done with small results. Behind an island a passage was found leading into a big lake beyond the hill, back of camp. For convenience we have been naming some of the lakes for members of the party, so today's discovery was christened Lake Smith, after its finder.



"IMPROVEMENTS" SPOIL NATURE'S FASTNESSES

A dam at the outlet of Lake Matamagasi to aid logging operations led to the usual disastrous effect on the forest border of the rise and fall of the water. The scenic beauty of such lakes is destroyed when the water is raised until it invades the timbered shores.



BEAVERS BUILD A NEW KIND OF HOUSE ON THE SHORE OF LAKE MATAMAGASI

The animals, seeking to escape extermination, have dug tunnels into sloping banks for 30 or 40 feet. At the end of these are chambers large enough for their families. Overtrapping of the region causes such change of tactics.



LAKE CHINIGUCHI IS LOVELY

On four trips into this district the author and his friends occupied at intervals the beautiful camping site shown here. This and adjoining lakes, in a government forest reserve, are destined to maintain their natural beauty for an indefinite period.



A 15-MINUTE CARRY WAS JUST AHEAD

The author and his companions paddled along the rocky shore of Dewdney Lake to a rough landing at the beginning of the longest portage they passed on their way through the Wanapitei district of Ontario.



THIS IS THE FIRST NIGHT PICTURE OF A MOOSE EVER TAKEN

When the flash was fired at this old cow, she was facing away from the photographer and was so startled that she turned and dashed into the lake, passing the canoe so closely that she knocked the camera overboard from the table in the bow. The plate was saved by immediate development. This adventure led John Hammer to say, "If a cow moose will do this at night, what will happen when we meet a bull moose?" This was answered the next season, but not in the way expected (see text, page 156).



THE ONLY RESULT OF A DAY'S HUNT FOR BULL MOOSE WAS DISAPPOINTING

Bullfrogs attain large size in the small lakes of the Wanapitei district, where their deep guttural notes at night almost equal the bellowing of alligators in Florida. After the foregoing picture was taken, one of the party tossed a lighted and half burned cigarette at the frog. To our amusement, the object seized in mid-air disappeared into the animal's mouth, but it came out instantly and fell 10 feet away (see text, page 151).

July 26: Today the photographer was more successful, for the curiosity of a white-tailed fawn brought it into range, and later a cow moose and a deer also had their pictures taken. The photographic section of the party now wears a more cheerful manner, for the expedition has at last produced some results.

July 27: The fisherman of the party was out at 6 in the morning trolling for bass and brought in three three-pounders. The photographer added a good antlered buck deer to his bag.

July 28: Spent the day thoroughly examining Lake Smith, which has charming scenery. A sand beach more than a mile long was marked with innumerable tracks of deer and moose. Bass were plentiful off every rocky point. After supper a big bass carried away the fisherman's hook, and so ended the day.

July 29: The day began with cloudy skies and a low barometer, but, later, gleams of sunshine promised better things. About noon we broke camp, planning to explore

some lakes to the west that Joe knew about. From West Bay, in Lake Chiniguchi, we portaged to the first of a series of small ponds, which we crossed. Another short portage brought us to an unnamed lake where we found a splendid camping place on a point covered with huge rocks and big pine trees. We decided to camp for a few days in this setting. Late in the afternoon we tried the fishing and found plenty of bass and pike. That night we slept on balsam boughs and were serenaded by many mosquitoes.

July 30: This fine round lake was named for John Hammer. We are finding so many unnamed lakes that our stock of names from members of the party will soon run out. It would be difficult to find better fishing than here, but the moose and deer do not like our big camp fires.

One night the camp fire was extinguished early and, after requesting the others to keep quiet, John and I went in a canoe to a sand beach at the other end of the lake, a few hundred yards away, where I hoped



THIS BULL MOOSE WAS NOT BELLIGERENT

Feeding in about five feet of water, he was approached cautiously, and the flash was fired just as the head was raised. The animal paid no attention to the explosion and glare, perhaps considering them as thunder and lightning, for he immediately again thrust his head deep under water for another mouthful (see text, opposite page).

to get my first flashlight moose picture. As we cautiously approached the beach, we saw a pair of eyes dimly reflecting the jacklight, about 20 feet back from the water.

Fired at the right distance, the flash threw into bold relief the form of a rather disreputable looking old cow moose. She was standing facing away from the camera so that her eyes first caught the startling reflection of the brilliant light from the trunks and leaves of the trees and bushes in front of her (see illustration, page 154).

She at once turned and dashed away from this display, running into the lake and passing so close to the canoe that she struck a corner of the projecting table in the bow, knocking both cameras overboard, and then passed into the darkness and was seen no more.

The cameras were promptly rescued, being kept on the surface by the air-tight bellows. The negatives were hurried back to camp, where prompt development saved them, and completed the record of the first

moose that ever became the victim of flash-light photography.

John Hamner, who wielded the stern paddle that night, as so often before and since, had heard many stories of the belligerency of the moose when facing a jacklight. On this occasion, after the moose had gone, he looked nervously over his shoulder and remarked, "If an old cow like that can act so, then something will be doing when we meet a bull." I also indulged in some speculation on the subject as I fished the cameras from the water.

BELLIGERENCY OF THE BULL MOOSE

A prevailing impression, shared alike by most novices and some experts, is that the moose, especially the bull, will deliberately charge the jacklight of the night hunter. In many parts of Canada and the United States I have been urgently advised against trying to take flashlight pictures of this animal from a canoe at night.

I recall with distinctness an incident of many years ago when a hunting chum of mine came back from northern Minnesota, where, with one of our oldest guides in charge of the canoe, he had shot at a big bull moose from behind the jacklight. After the moose had charged over them, knocking the jack overboard and making a big hole in the bottom of the canoe, they passed the rest of the night on the banks of the muddy marsh, vowing never to interfere with a moose again under such circumstances.

What would happen when we encountered a bull moose at night was revealed on the shore of Lake Matagamasi in this same district on our third trip the following year. It follows so aptly the experience with the cow that I give it here.

One night, as we searched for moose in a long, narrow slough, an animal was heard feeding in the water at the edge of the marsh, where pond lilies grew in profusion. As we advanced slowly, the light disclosed a great, half-submerged body, and a big bull moose appeared before our eyes, his jaws working energetically as he crushed the roots of a water lily dragged from the bottom of the pond. He looked distinctly formidable, and the convulsive movements of his jaws heightened the effect.

It was only after repeated signals from me that John brought the canoe cautiously within 25 feet, at which distance the cam-

eras were focused. Then came a great flash, a heavy boom, and all was silent for a moment as the smoke of the magnesium powder drifted away.

By this time both paddles were in the water, and we were preparing for the worst. Yet there the moose stood, his jaws now motionless, the picture of what—anger or fear (see illustration, opposite page).

Before the question could be answered, down went the great head with a splash beneath the muddy surface. Was he going to turn himself into a submarine and spike us from below?

No; he was simply engaged in pulling up another succulent lily root for his supper, satisfied that the little jacklight, behind which nothing could be seen, was but a trifling, insignificant thing, while the bright flash and the boom was a rather weak sort of thunderstorm.

Reloading the flash and reversing the plate holder, I waited until the head came to the surface and then fired a second time. In a fit of carelessness I talked too loudly, whereupon with a rush the big animal pulled himself up the bank and disappeared in the summer darkness.

MOOSE STAND FOR TWO PICTURES

Year after year I had similar experiences, always finding that it was an exceptional case not to have the opportunity to obtain at least two photographs of the same moose at night, a thing that had never once happened during many years with the white-tailed deer.

We planned to make a circle among the lakes and reach Wanapitei Lake again by the Upper Wanapitei River. With this in view, Joe and the fisherman went out the second morning to locate a trail across to Sam Martin's Lake, which Joe believed is only a few miles south, but they returned without any definite information, beyond reporting many moose signs. In the afternoon I portaged across to a lake where Joe reported he had seen many moose every fall. A fine string of bass and pike rewarded an hour's fishing, but a fog shut down in the evening.

July 31: I returned to camp in the morning in time for breakfast and reported having seen four or five large bull moose late yesterday afternoon. I had snapped my camera at the largest bull I had ever seen, but the result was doubtful because of the rain. At night a heavy fog had prevented



GOOD GOING ON A PORTAGE IS A RELIEF

Many of the carries in the Wanapitei district were rough, but some had broad trails. Canoes were usually taken across first to be in readiness to receive their loads.



PACKING IS HARD ENOUGH, EVEN ON GOOD TRAILS

The canoe shown in the upper picture has already been carried to the end of the portage and made ready to receive the gear, which is being transported by man power.



EVERGREENS COME DOWN TO THE WATER

Shores of many of the lakes in the Wanapitei country are bordered with beautiful coniferous forests that enhance the pleasure of canoe trips.

me from getting pictures, even when within 20 feet of the wading animals.

August 1: This morning we made two portages, crossing a pond on the way to a long, narrow lake extending north and south. At its north end we went up a narrow, crooked stream that was so blocked with logs and fallen trees that we had difficulty in following it. After passing a small lake on the way, we found the going-up the stream worse than ever.

Here Joe's attention was directed to the compass, which showed that we were traveling north instead of southwest, our proper direction. Rather than descend this difficult little waterway, however, we continued, and at its head came to a small lake and a portage across from it to still another lake which Joe hoped to recognize.

Camp was made in damp pine forest and fish were caught for supper from water close by. We then took the trail to the next lake with Joe to see if he could recognize it. When we arrived on its shore he said it was not Sam Martin's Lake, with which he was familiar, and we knew then that we were lost, so far as the country ahead was concerned.

Rather than return over the toilsome way we had come, we decided to go on and carried a canoe across an obscure, level trail and launched it in the unknown lake. It was a fine sheet of water, diversified by little bays with sand beaches and rocky islets, affording ideal feeding places for moose. About its shores were many tracks of moose, deer, and wolves.

As we launched the canoe, the setting sun enhanced the beauty of the lake. Very soon our attention was attracted by heavy splashing at regular intervals in the water near a point extending into the lake. This was recognized as being made by a bull moose plunging his head under water to feed on aquatic plants. Because a full moon was due to rise at sunset, I had not brought along a camera with a flashlight.

We paddled rapidly in the direction of the sound, and, approaching it, we slowly and cautiously rounded a small rocky point close to the shore. Ripples on the calm surface of the water indicated the proximity of the animal and then we saw a few inches of its back projecting above the surface, but so small a part of the animal that we could not tell which way it was headed.



BEDLAM BROKE LOOSE AS THE POWDER EXPLODED

Paddling along the stream between Lakes Matamagasi and Wanapitei during one of our trips the author suddenly came on this nearly submerged cow moose. When the flash was fired, a calf in the bushes began uttering a loud whimpering cry, and the mother surged up on the adjacent bank and stood there replying with an extraordinary loud wailing bellow.

Suddenly two widely separated knobs appeared, followed by the rest of the broadly palmated antlers of a very large moose.

He was headed away from us, but, as if sensing our presence, he swung his huge, dripping head back over his shoulder and gazed steadily at the canoe, which rested silently on the water only a few yards away. If the creature had been a deer, it would have leaped ashore and been out of sight in an instant. The moose, however, eyed us calmly and then, turning deliberately toward the opposite side of the little cove, swam some 50 feet and clambered, in a calm and dignified way, up the rocky shore to the edge of the bushes. Then it went tearing its way through the forest at top speed.

The spread of its antlers was, I am certain, more than 60 inches. The actions of this forest monarch appeared to indicate that it did not wish to show alarm when in the immediate presence of its foe, but as soon as it attained the cover of the forest, it gave way to the fear that must have possessed it from the moment its eyes rested

on us so close to it. After this breath-taking encounter we returned over the portage to camp.

August 2: We were awakened at 2 a. m. by the piercing howls of a band of wolves after a deer. In the darkness, these wild cries from the forest were intensely thrilling.

Our provisions were now running low, because of our slow progress, and we were forced to depend largely on catching fish or killing a deer by chance with our small revolver, the only firearm we carried. We made an early portage to the beautiful lake visited last evening and it appeared even more attractive than when we first saw it. Since it had no name on our map, it was christened Shiras Lake. After paddling for about five hours, we located another portage which followed up the course of some roaring rapids discharging from another lake.

This brought us to a long, narrow lake extending north and south in exactly the right direction for us. We halted for luncheon on a breezy knoll under the pine trees. Joe did not know where we were, but we hoped for the best, and husbanded



WATER LILIES ATTRACT MOOSE TO LAKE MATAMAGASI

The northwestern arm was a favorite feeding place for them. They pulled up the roots of the plants and ate the numerous tender sprouts. Afterward the dead fibers, several feet long, floated ashore. The night this picture was taken was cold and on the middle of the back of this animal a mass of large deer flies were gathered, evidently for the warmth (see text, page 165).

our food. As we continued our journey, we saw a fine bull moose, of which I took a photograph. The lake proved longer than we expected, but as its course led us in the right direction, toward the south, we went on cheerfully.

From its southwest bay we portaged to what we named Decaire Lake, and three or four miles farther, at the south end of this lake, we found and followed a portage trail about a mile to still another lake which Joe failed to recognize, but which he said was not Sam Martin's Lake.

We camped at a point on its shore and Joe went off at 6:30 in the evening to locate a trail. He returned before 8 o'clock p. m. and reported having done this. No fish were caught today and our larder is sadly depleted.

August 3: From last night's camp we paddled only a quarter of a mile to the head of a bay at the southeast end of the lake, to the end of a portage trail that Joe told us would lead to the long-looked-for Sam Martin's Lake. This was the worst portage

we had encountered, for it combined a confusion of hills, swamps, rocks, and other obstructions for about two miles.

Once in the long-desired Sam Martin's Lake, we tried for some much-needed fish without success, and then paddled to the end of the trail leading from it to the Wanapitei River. After luncheon Joe began cutting the undergrowth from the trail and I found a large pair of shed moose antlers and obtained a picture of a buck whitetail in a pretty little bay. On my return I caught, by trolling in deep water, a two-pound lake trout, which was a source of joy to all the party.

August 4: We were up early in the morning and disposed of the remnants of our food supplies, including flapjacks, prunes, and coffee. Joe had put the trail in good condition and we made a quick transfer, except for the delay caused when John lost part of the camera outfit and then lost himself trying to find it. He was soon rescued by a search party and we started down the Wanapitei River. It is a narrow, deep, and



A YOUNG BULL MOOSE PEEPS FROM THE EDGE OF A MUSKEG

He gazed steadily at the approaching jacklight as he paused before entering Lake Matamagasi to feed on submerged water plants.

swift stream so well adapted to floating logs that its presence dooms the original stand of fine trees of the bordering forest.

For ten miles we paddled down the stream, passing several moose feeding in

adjoining sloughs, but the canoes were too heavily laden to stop in time to get photographs. Then we came to Wanapitei Lake and an Indian reservation, where we had a mighty luncheon to make good for re-

cent short rations. At 2:30 p. m. we left for the south end of the lake against a strong head wind and stopped to rest on a rocky islet blue with huckleberries. At 6 p. m. we reached our destination, and the end of the canoe trip.

Early in August, 1904, in accordance with plans made at the end of the Wanapitei trip of 1903, with E. Z. Smith, Doctor Carrier, and guides, I returned to that beautiful lake region. During this trip we made another circuit from the northeast end of Lake Wanapitei to the headwaters of the Wanapitei River, and thence down the river to the northwestern end of the lake.

On this expedition we knew the way and enjoyed it more than we had during the uncertainties that beset us last year. The good fortune we had in getting photographs of game animals and the adventures enjoyed made this the most successful of the three visits to this region. No connected account of this trip need be given, but some of the experiences enjoyed while hunting with the camera seem worthy of record.

DOES SCENT EVER FAIL MOOSE?

On this trip I became satisfied that a moose after plunging its head repeatedly below the surface for water plants temporarily loses the sense of smell. This fact seems to have been shown frequently at night when we approached or circled about moose in the water, for they appeared oblivious to our presence, whatever the direction of the wind.

One instance of this that we observed was impressive. Because of the flooding of Matagamasi Lake for logging purposes, much of the adjacent lowland had become submerged, with the result that the moose often fed back from the banks instead of entering the deepened waters of the lake.



ONE MOOSE POSED FOR A CLOSE-UP

The cow struggling through the deep mud of the slough suddenly turned back and passed close to the stalled canoe. A quick shot with the flashlight caught her head. By day moose came to bathe in this mud to gain a coating for protection against flies.

One evening John and I located some moose behind the bushes lining the bank of a slough where they were feeding on a recent growth of aquatic plants. Hoping the animals would come beyond the bushes and enter the slough, we waited for a long time, listening to the big creatures munching the roots and struggling about in the boggy soil.

Becoming discouraged, I stood up in the canoe and over the tops of the bushes could see two young bull moose scarcely 25 feet away. They were probably twins, for, except during the breeding season, moose do not usually consort with one another. In this respect they resemble the white-tailed deer. They were so close to us and had been there for so long a time that I wondered why our scent did not alarm them.

To test this matter we ran the canoe to a point where the slight breeze would blow directly toward them, yet they showed no fear. When the side of the canoe was struck with a paddle, the moose plunged away to higher ground, proving that their ears were acute, even though the olfactory nerves had been dulled by the mud and water drawn into the nostrils as they fed. Warren states that when a moose submerges its head it drops its ears at an angle that also excludes the water.

On our return the following night, we heard an animal coming toward us at a

point where there was a wide opening in the bushes. It was a two-year-old bull moose. As it stood on the bank, surrounded by cedars, I fired the flash. It was probably one of the pair seen the night before. If so, the little bull must have been doubly impressed by the strange occurrences at each of its appearances in a heretofore secluded spot.

A FLASHLIGHT THAT NEARLY KILLED

Another night John and I went out for moose pictures at the north end of a long arm of the lake. When passing a shallow bay, I heard an animal walking in the water and swung the jacklight in its direction. A pair of brilliant, glowing eyes indicated that it was a deer; for the eyes of the moose are dull and seldom show beyond 50 yards.

We paddled quietly in, and there loomed up in the circle of light a gray animal standing broadside. At first it looked like a caribou, but since these animals are largely diurnal and seldom feed on water plants, I was not surprised when it proved to be a fine white-tailed buck (see illustration, opposite page).

When we were within 25 feet, I fired the heavy flash, completely blinding the animal. Instinctively it seemed to know the way ashore, and on reaching the base of the slope bounded upward in long jumps. At the top it ran headforemost into a big pine. Falling back on its haunches, it wavered a moment and then toppled over, sliding down the hill to the edge of the water, where it lay motionless for a short time.

John whispered, "I guess we are going to have some venison for breakfast."

But the animal had a different opinion; for, struggling to its feet and regaining its eyesight, it again mounted the hill and disappeared.

After this adventure we continued along the lake to a long, narrow slough, at the left-hand entrance of which began a portage trail to the Sturgeon River and lakes lying farther east, conspicuous among which is Lake Timagami. This slough contained thick mud that came almost to the surface. Here in the daytime we had seen moose submerged to their heads to avoid the summer flies. When they emerged they carried away such a tenacious coat of mud as to provide immunity for the rest of the day.

We had found it impossible to paddle

close enough to get a daylight picture, for our slow progress attracted the creatures' attention and they would go ashore. Either no aquatic plants ever grew in this mud, or they had long ago been uprooted. Consequently I had doubt of seeing a moose there in the night.

As we entered the slough, we swung the jacklight to the left. There on the bank stood a large cow moose, not more than 25 feet away. Swinging the camera table to cover her, I was about to fire the flashlight when the animal sprang into the water and approached the canoe too close to be photographed. The glare of the jacklight seemed to alarm it, and it started up the muddy slough with the canoe in pursuit.

As the mud became deeper and deeper, the race was nearly an even one. Suddenly the animal decided to return the way it had come and swung about. At this the flash was fired, and a moment later its great heaving body scraped along the side of the canoe, all but upsetting it. Before we could turn about, it had climbed the bank and disappeared, somewhat to our relief.

Toward the end of the week a heavy north wind brought exceptionally cool weather, almost bordering on a frost. As expected, when we went out after moose that night, a heavy fog blanketed the warm waters.

DAYTIME NUISANCES WELCOME AT NIGHT

On nearing the edge of a swamp, we heard a moose feeding on lily roots, and soon were able to see a cow in several feet of water, close to the bank, where the off-shore wind had lifted the fog, thus bringing the animal into plain sight. While maneuvering for a picture we approached so near that my attention was attracted by a large dark spot just back of the animal's shoulders.

At this close range the light of the jack was sufficiently strong to show a great cluster of deer flies massed like bees when preparing to hive. These daylight pests had declared a truce, and were seeking the warmth and protection of their host's body.

When, finally, the flash was fired, many of the flies boarded the canoe. Whether they were disturbed by the brilliant flash and noise or attracted toward the jacklight under the impression that it was emitting warm rays of sunlight, it was hard to deter-



A BIG WHITE-TAILED BUCK CAME TO GRIEF AT LAKE CHINIGUCHI

As seen in the light of the jack, this animal was mistaken for a caribou. It was so blinded by the flashlight that as it ran panic stricken up a hill it collided head on with the trunk of a tree and fell down the bank, where it lay stunned for a short time before going away (see text, opposite page).

mine. It was some time before we could rid the canoe of these unwelcome visitors, which in a sluggish way crawled over our hands and faces, prepared to seek a new lodging place for the rest of a chilly night.

We camped several days at Long Lake before undertaking the difficult portage to

Sam Martin's Lake, where we had been lost the previous year. With John I skirted the shore in the canoe looking for ruffed grouse and spruce partridges. A mile from camp, chancing to look across the lake, I saw a medium-sized black bear on top of a high, rocky slope near the shore, where it was eating huckleberries.

Pointing it out to John, I said it was unfortunate that we had no rifle, for my little 28-bore shotgun and fine shot were useless. He at once began feeling in a canvas bag and produced a paper shell loaded with two flattened slugs.

"There," said he, "didn't I tell you this cartridge might be useful on our trip?"

Intent on getting a picture first, and then trying to shoot the bear, we paddled across the lake. The animal was feeding so intently that it appeared oblivious to its surroundings. Keeping out of sight by skirting the shore, we rounded the rock upon which it was located.

AN ADVENTURE WITH A BLACK BEAR

As the bow passed the edge of the rock, we saw the bear standing broadside about 40 feet away, but the camera mounted on the table at the bow could not be tipped up high enough for a picture. This was another example of the difficulty of using both gun and camera at the same time.

Raising the little shotgun, I fired the right barrel at a point back of the bear's shoulder. The creature went down instantly and rolled over on its back with its four legs sticking stiffly up. John and I both commented in surprise at the result of the shot. The bear rolled over on its side and began slipping down the sloping rock. Reaching the edge it toppled over, fell five feet into the water, and disappeared.

A moment later it came up, seized a little projecting pinnacle of rock with its front paws, and bit it so hard that it broke several of its front teeth. This all occupied but a few seconds, and I quickly directed John to paddle the canoe within a couple of feet of the bear to insure a finishing shot. To this he remonstrated because the bear might capsize the canoe in deep water.

From the bow I leaned over, and holding the little gun at arms' length, like a revolver, fired a load of bird shot below the animal's ear, killing it instantly. It was a young, fat animal and its meat was so edible that the party ate a considerable part.

One of the French-Canadian guides, however, refused to taste it, saying that the skinned carcass "looks too much like my grandfather." He carried his prejudice to the extent of even refusing to eat anything cooked in the same frying pan that had contained bear meat. During the evening we fried out a supply of grease from the bear's

fat that filled our needs for oiling guns and other similar purposes for several years.

On reaching Shiras Lake, as it had been named on the trip of the preceding year, we camped several days on a beautiful island. One night Smith, John, and I prepared for a trip to the far end of the lake, where a shallow bay attracted moose and deer. Because the weather was threatening and, in case of rain, we might wish to return through the center of the lake instead of following the long shore line, a lighted lantern was placed on a low rock at the water's edge.

Soon after we reached the bay, we heard thunder, and large drops of rain warned us to return. Propelled by three paddles, the canoe moved rapidly.

On rounding a point, we suddenly almost ran down a deer feeding, head down, with its back toward us. A sharp whistle sent it bounding off as the flashlight recorded its picture (see page 168).

When we entered the open water of the lake, no light from our lantern could be seen, and we followed the shore through fear of missing camp. We had traveled only a short time when a distant twinkling light was seen low down, and we realized that the curve of the earth's surface had at first concealed the lantern near the water.

REMINDING THAT THE EARTH IS ROUND

We reached camp just as the storm broke. Our beacon light had proved of service in pointing the way, and at the same time had taught us that the earth's curvature should receive consideration when a light is put out, even on a comparatively small lake.

Pleasant recollections of the lakes and streams in the northeastern part of the Lake Wanapitei district years before led me, in 1920, to take a small party of friends and make a fifth visit there. After making arrangements for the trip, we learned that a new transcontinental railroad had been built through the district, passing the south end of the lake. We felt certain that this would have greatly changed game conditions, but decided to go as planned.

We were able to go directly to the lake by rail, thus avoiding the 14-mile portage formerly necessary. Soon after our arrival we learned that the series of connecting lakes I had formerly visited had become a canoe route traversed by many parties, and that the moose and deer so plentiful

then had been driven back to the more remote and less disturbed places. This result had been helped by the opening of the region to fall hunters as soon as the railroad came in and provided a convenient means for taking out the game killed.

Since our trip was primarily for fishing, I was the only disappointed member of the party. We caught many big pike and black bass and passed pleasant evenings about camp fires.

A LIGHT AND COZY CAMP BED

The greater accessibility of this formerly remote district had its typical effect in pushing back the game animals. We were much pleased to learn, however, that both moose and white-tailed deer were yet numerous about the lakes back from the traveled canoe routes.

I noticed with interest that my companions, like me, were using what we were accustomed to call "the gunny-sack camp bed." This I had first seen in use more than 40 years before by my father and grandfather. These ancestral fishermen camped each season along the shores of Lake Superior and, not being accustomed to roughing it after the manner of the big-game hunter, believed in a comfortable bed after a day in the open.

At that period the young members of the party were entirely satisfied with beds made from balsam boughs, which were fairly buoyant for several days, but left the floor



A LIGHT AND UNUSUALLY COMFORTABLE CAMP BED IS SIMPLY
CONSTRUCTED

Beneath the six-foot canvas sack, supported by poles, is ample room for rods, guns, cameras, wearing apparel, and miscellaneous articles, all of which are accessible and safe. This cot can be used as a lounge during inclement weather. When it is taken down the ends of the sack can be tied and it can be made into a fairly waterproof pack bag (see text below).

of the tent unkempt, and a likely place to misplace or lose small articles. On the coming of the automobile tourists most tents are now supplied with canvas cots, ordinary mattresses, or sleeping beds of inflated rubber. None of these heavy, or awkward, contrivances approached in comfort or usefulness the gunny-sack bed, especially in the more remote camps.

This bed weighed less than two pounds before being assembled, and when in place was much superior to a spring mattress, while beneath it was ample space for all one's personal belongings where they were



IT IS THRILLING TO SLIP UP ON THE QUARRY

As the canoe on Shiras Lake approached, a whitetail fed, unconscious of the occupants' presence until the boom of the flashlight explosion sent it speeding for shore (see text, page 166).

safe and accessible, a convenience that is lacking in beds resting on the ground.

The material for this camp convenience consists of a bag made of gunny sacking or stout canvas, six feet long, two and a half feet wide, and open at both ends. To set it up for use, two slender saplings are cut and run through the bag, the end of each being nailed into notched logs supporting the frame. Such a bed is strong, steady, and particularly adapted for a sleeping bag.

The supporting poles on each side of the gunny sack should be spread as far as possible apart, so that the surface of the bed is taut. This will allow an air space of

several inches between the upper and lower surfaces, with the result that one really rests on air, the upper surface adapting itself to the varying pressure of the body.

Without some such arrangement for sleeping it is important that a level space, with good drainage, and free from irregularities, be selected for the tent site. With it little heed need be paid to these requirements, for the elevated bed can be adjusted horizontally to any slope or unevenness by the size of the end logs. When camp is broken, the canvas sack, tied at the ends, can be converted into a weatherproof pack-bag for bedding, extra garments, and other essentials.

CHAPTER VII

Wilderness of Northeastern Minnesota and Adjacent Ontario

IN the summer of 1909, learning that the Superior National Forest west of Lake Superior, in Minnesota, was about to be made a State game refuge, I prepared for a trip to see this section before the change. It had been my practice, with rare exceptions, to avoid photographing animals in national parks or similar reservations, since the habits of wild things are often changed after long and peaceful contact with man, and their lack of wariness makes a camera hunt among them of comparatively little interest.

The trip was arranged through Carlos Avery, then the efficient head of the State Game Commission, who later became recognized as one of the leading game conservationists of the country. Mr. Avery joined me for the outing and took with him one of his most experienced game wardens. We had two canoes, John Hammer being the rear paddler in mine, ready to act as an assistant in my photographic work.

We left the railroad at Tower, and canoed across Vermilion and Trout Lakes and beyond through Little Trout Lake. From there we portaged to the Loon, or Little Sioux River, which we ascended for some distance, but, on account of low water, never reached our proposed destination. We returned by the same route.

Our little voyage took us into the heart of the Superior National Forest. In this area, during the same season, the State Legislature forever barred the use of guns. This great tract will long stand as an admirable example of a wise move to conserve wild life and offer wilderness camps to nature lovers.

ENCOUNTER WITH POACHERS

The first day out, as we entered Loon Lake, we saw a canoe containing three persons leaving a small island ahead, for the purpose, we supposed, of greeting the newcomers. A few minutes later, however, the occupants of the canoe appeared to see us for the first time. Turning about, they paddled vigorously toward the island.

At this the deputy warden said to Avery, "Their actions look suspicious, and I think we had better investigate."

A spirited race then began; but, having a considerable lead, the suspected party reached shore first. When the Commissioner and his deputy landed, one of the campers was seen hurling a large piece of meat into the water, while about the tent was other evidence of an illegal kill.

When questioned, the young men candidly admitted shooting a cow moose the night before, although they had hoped to kill a smaller animal, such as a deer. The party was put under arrest and their outfit confiscated. Two of the prisoners departed for the town of Ely in their own canoe, escorted by the deputy and one of the poachers in the official canoe. This necessitated Avery's transfer to our boat with supplies for the two days that his warden would be absent.

ALL GUNS SHOULD BE BARRED DURING CLOSED SEASON

It should be said here that the young men caught violating the game law were well educated and agreeable, even under these circumstances, and belonged to a class that ordinarily complies with game laws. With a rifle handy, the temptation to shoot when opportunity offered was too great to resist. This episode affords a good illustration of the result of carrying firearms in game districts during closed seasons.

The young hunters not only lost the meat of the animal they killed, but became lawbreakers and suffered the confiscation of their boat and equipment in addition to whatever penalty the court might inflict. Moreover, the young moose deprived of its mother was left to starve, while the pleasant outing in a beautiful country was brought to a disastrous end.

Many years ago I came to the definite conclusion that more than one-third of the deer killed annually in northern Michigan were shot out of season. These illegally killed animals were mostly does and fawns, which, commonly frequenting the water-courses and more open forest, were easy victims. Their destruction largely counteracted the benefits of the buck law. In Wisconsin, Minnesota, and other big-game States I believe the same conditions pre-



MINNESOTA MAKES A CONTRIBUTION TO THE SCENIC SHORES OF LAKE SUPERIOR

The North Star State, by reason of its climate, its woodlands and prairies, its countless beautiful lakes and connecting waters, has long been a paradise for wild life and a mecca for the sportsman and tourist. It has wise laws and a most efficient game commission (see text, page 180).

vailed so long as outing parties and others were permitted to carry guns in the closed seasons.

In 1925 I prepared a bill prohibiting the carrying of guns in hunting territory during the closed season, except under permit, which would be granted when justified. This measure was promptly passed by the Michigan Legislature on the recommendation of the leading sportsmen's associations of the State. Although it was not enacted exactly in the form submitted, the beneficial effects of the law became at once apparent (see Chapter XXIV).

The hundreds of lawless hunters who formerly had sought the woods on the well-based belief that they would not be caught actually shooting a deer, or while taking it home after dark, soon realized that under the new law the mere act of carrying a gun in hunting territory gave all the evidence needed for conviction. Such a regulation not only has saved thousands of deer, but

has rewarded the law-abiding sportsmen through a marked improvement in the hunting during the legal open season.

After the departure of the deputy with his prisoners, our heavily laden canoe proceeded on its course. While we were following a narrow channel leading through a meadow, we saw a small black bear at the water's edge.

A BEAR, A BUCK, AND A SALT LICK

This appeared to be a chance for a picture, and since the bear was facing us, we approached cautiously. When we were within 75 yards, the animal turned, broke into a run, and soon disappeared in the woods. Although the bear apparently had not seen us, I felt sure that it had taken a furtive glance and decided the time was at hand for it to vanish.

A little farther along, on the right of the stream, there was a muddy pool backed by a large, isolated rock. I was confident that the roiled water indicated a natural salt

lick, and when I went ashore this opinion was confirmed by many deer tracks of various sizes along the borders of the pool. The sun being right for a late afternoon picture, a blind was built on the side toward the sun to give proper illumination to anything that might come, and the canoe was sent around the next bend to remain until signaled. Before an hour had passed there came to the lick a large buck, its antlers fully developed but still in the velvet. I took several photographs of it and then recalled the canoe.

FOG AND "ESKIMO" MOSQUITOES MAKE
NIGHT LIVELY

During the trip the weather was generally clear throughout the 24 hours, and it was exceptionally warm during the daytime. In the shallow, smaller lakes and streams the temperature of the water often exceeded 75 degrees during the day while the sun was shining. After dark, however, the temperature of the air in this region dropped into the lower fifties.

As a result of this marked change, the surfaces of the small lakes and watercourses were blanketed with a heavy layer of fog the greater part of the night, a condition that lasted until the air and water temperatures approached an equality. While out after night pictures of moose and deer, we could rarely see the animals if they were in the water, although a little beyond the banks vision was usually clear. As the waters gradually cooled, the fog would disappear; but the moose, being early feeders, were usually gone then, and ordinarily only deer were to be seen.

An odd circumstance, noted wherever we went, was the absence of mosquitoes during the day; but when we returned to camp at midnight, with the temperature near its lowest, we would be attacked by a large number of these pests. John called them "Eskimo mosquitoes," because, he asserted, they had migrated from Hudson Bay and, not liking the heat of the day, kept under cover until a chilly atmosphere invited activity. Be that as it may, we had to build smudges at an hour when most mosquitoes in other regions visited by us had retired.

Flowing by one of our first camps was a narrow, sluggish stream containing water plants prized by moose and deer at this season of the year. The first night we



ALL IS GAME TO THE CAMERA

Failing to find moose, the author took daylight pictures of the Lake Superior chipmunks, which came singly or in groups to gather scraps of food near the cabin door. The bottom figure is an eastern cousin which joined the others.



A BIG PORCUPINE TOOK TO THE WATER

One day as the author paddled along a watercourse he encountered this fellow swimming across the stream. Note how hairs on the crown and middle of the back are erected. The buoyancy of the hollow quills causes the animal to rest high in the water.



HE WAS AN UNWELCOME SHIPMATE

After the swimming porcupine shown above had been photographed, the canoe drifted close to it and it promptly climbed aboard, to the consternation of the nearest occupant. This unusual sight was photographed by one of the author's companions from another canoe.

went out in a canoe, we heard several moose just ahead, but our vision was wholly obscured by the dense fog. As we cautiously approached, guided by the sound, the ripples on the smooth surface of the water made by the feeding animals indicated that they were only a short distance away.

Then the fog lifted for a moment and we saw four moose close to us, one of them a large bull. While we were trying to decide how to maneuver the canoe so as to photograph him, the fog once more closed down, leaving us in a state of anxiety.

Suddenly out of the mist swam a large cow moose, headed directly for the canoe, and a collision seemed imminent. We gave a shout and I fired the flashlight, causing the animal to turn aside. While the creatures probably were not much

frightened by the report of the flashlight, to which moose have always appeared to be indifferent, the sound of a human voice caused great alarm and the four big animals very near us could be heard struggling through the mud toward shore.

After they were gone we paddled silently along, hoping for better luck. Soon we heard a moose feeding, apparently on shore. Again the white fog-curtain lifted and disclosed a fine, big bull standing on a small grassy island. An instant later, in the most provoking manner, the fog suddenly shut down again.

After a short delay the animal was heard stepping into the water, and fortune fa-



A DOWNY YOUNG HORNED OWL WAS DRIVEN FROM ITS SHELTER BY CROWS

It belongs to a species known to be among the worst destroyers of ruffed grouse and other small game.

vored us, for the fog lifted high enough to show the great beast crossing to the shore. Instantly I fired the flash and obtained the picture. The suspense and the thrilling exultation experienced during successful camera hunts of this kind can rarely be equalled when one is armed with a rifle and bags his game.

FLAPJACKS AGAINST CORNDODGERS

One morning the deputy warden asked permission to try his own brand of flapjacks in place of John's corndodgers. He called his product by a term which is common in the vernacular of the West, but which seldom appears in print. John said



A NARROW TRIBUTARY OF GUNFLINT LAKE IS TYPICAL OF STREAMS OF THE REGION

These watercourses along the Minnesota-Ontario border are favorite haunts of the moose in summer, but when the solitude is disturbed by frequently passing canoes the animals withdraw to a distance of a mile or more.

it was a mighty good name for them, because they were so tough his knife couldn't cut one. He thought, however, they had a valuable quality, for in case the canoe was punctured one would be better than a rubber patch.

These pleasantries reminded me of old Jack La Pete's "doughdogs." These he refused to make if we were going out in the water, because, he always averred with a grin, if a fisherman who had eaten one of them fell overboard, he would never come to the surface again.

A well-made flapjack, served hot with maple syrup or honey, is most appetizing, but John's corndodgers seemed to me to have greater merit. Nothing is less appealing than a cold flapjack, but the dodger, made of one-third cornmeal and two-thirds flour, not only becomes more appetizing, but later can be carried along for a mid-day lunch, since its crispness makes it more palatable than a soggy flapjack.

LOW WATER NECESSITATES RETURN

We were now on the Little Sioux River, which gradually decreased as we ascended until it became too low for canoe navigation, and forced us to turn back. A fitting climax to the trip was a flashlight picture of a large bull moose taken where the rocky bed of the stream prevented further navigation. We had seen enough of the country to give every assurance that its conversion into a game refuge would benefit both man and beast.

After the canoe trip with Carlos Avery in 1909 to some of the streams and lakes in the vicinity of the boundary, on the Superior National Forest, a great desire remained with me to see the country to the north of the area we had covered. This lies in a great tract of coniferous forest, one of the finest in existence anywhere along our northern border, and extends far into Ontario. This part of Minnesota also constitutes the best remaining moose range in the United States and adjoins the vast region occupied by these animals in Canada.

Finally my opportunity came when the American Museum of Natural History, at my suggestion, planned to have a series of moose collected in western Ontario for one of the great habitat groups for which this museum is famous. With this in view, H. E. Anthony, curator of mammals in the museum, and I visited a chain of lakes and small streams forming the boundary waters

between Ontario and Minnesota. As usual I had my photographic equipment to try for pictures of moose and other game.

We left Port Arthur, Ontario, taking a southwesterly direction, on a train making bi-weekly trips to North Lake. At the lake an 18-foot canoe was at our disposal. To this we attached an outboard motor, and soon completed the rest of the journey to a small stream flowing into the eastern end of Gunflint Lake, which lies directly along the international boundary. There, on the Minnesota side, we occupied the summer cottage of a Marquette friend. Below it, on the margin of the little stream, was the cabin of the caretaker. Mr. Anthony had a scientific collector's permit from the authorities both in Minnesota and Ontario, and he was privileged to hunt on both sides of the boundary.

It took me only a day to discover that the long waterway on which we were located was the daily route of Ojibway Indians and many others going on business or pleasure through a region lacking railroads or other highways. I knew that no moose would be found near these traveled water lanes, and that we must look for them on lakes some distance back. By hunting some miles from the much-traversed waters, my companion required only a few days to collect the specimens he desired. My efforts to obtain pictures of stray moose were fruitless except for the daylight picture of a lone young bull.

Whenever I am in a district that fails to produce the large game desired, I resort to photographing other animals, however small. About the cottage in which we were living were many of the little Lake Superior chipmunks, among the smallest and handsomest of this numerous family. Their contrasting dusky and white stripes give them a brighter appearance than that of their larger relative.

CHIPMUNKS FURNISH CAMERA SPORT

These little animals had been accustomed to look for crumbs from the camp table, and chirped and frisked their tails as they gathered for the meal. I was not long in collecting a series of pictures here of an animal that I had previously neglected (see page 171). When food was supplied plentifully, they would quickly fill their cheek pouches and off they would go to increase their well-hidden store of winter supplies in some hollow log.



A WHITE-TAILED BUCK COMES IN SEARCH OF SALT

From a blind this photograph of a large fellow was taken as he stood at a lick against a beautiful background of rocks and forest.



THE CURTAIN OF FOG ROLLED UP, DISCLOSING A BIG BULL MOOSE

Exciting going is experienced in thick weather when the canoe slips through feeding grounds of these animals (see text, page 175).



OUT OF THE FOG TO THE WATER'S EDGE CAME A WHITETAIL

This striking photograph was taken after midnight when a heavy cloak of mist suddenly rose.

The bays at the east end of Gunflint Lake were shallow, and there the lake trout had begun spawning. During my previous summer trips to Ontario lakes these fish had been deep in the cooler waters and could not readily be taken. Here we caught a large number, not being limited to our daily requirements, for the caretaker desired an extra supply for salting.

FLASHLIGHTING AN OJIBWAY DOG

One afternoon when I was alone at the cottage, a large timber wolf came to the shore of the stream within easy rifle shot. I found a gun but no cartridges, and so was constrained to watch this marauder through the binoculars. He was evidently looking for dead fish or other edible matter along the edge of the water. When he departed, I decided to set out a flashlight at the place where he came down. This was baited with fish offal, and then I returned to the camp several hours before dark.

Within a short time, a large birch-bark canoe, containing an Ojibway family and several dogs, landed below the caretaker's house in order to repair their craft. The scene reminded me of my boyhood days on Lake Superior, where these Indians were once so numerous. Among the articles removed from the canoe were several sacks of wild rice obtained from the only lake in this vicinity in which this plant grew.

While the pitch was being heated for the needed repairs an Indian boy, followed by a large dog, went down the beach toward the place where the flashlight was set. I called and whistled, but my meaning was not understood, and the boy and his follower went on.

Turning the glass on the place where the flashlight was located, I saw the boy standing close by the apparatus eyeing it with interest. The dog, having a keen and discerning nose, hurried to the bait. An instant later a white cloud sprang up, followed by the usual boom of the exploding powder. The boy dashed out of his smoky surroundings, but the dog beat him to the canoe.

After an excited discussion, the Indians hastily loaded the canoe and departed, leaving the little pan of melted pitch behind as evidence of a panic-stricken exit.

This incomplete and fragmentary account of my visits to the Superior National Forest in Minnesota, and to the adjoining border

of the proposed Quetico Provincial Park, Ontario, conveys a most inadequate idea of one of the most beautiful wilderness areas remaining within easy reach of the majority of the people in this country and Canada. It lies in the Rainy Lake watershed, and its primeval forests contain thousands of small lakes and streams of varying size in a picturesque setting of wooded shores, giving way in many places to abrupt rocky escarpments.

The lakes are irregular and some of them have a length of from 25 to 30 miles. The streams vary from sluggish currents, moving placidly through marshy meadows, to dashing torrents broken by rapids and waterfalls. The region has been little frequented by man; it is unsuitable for agriculture, and over much of its extent the forests of tamarack, spruce, jack pine, birch, balsam, and poplar are too small to attract the lumberman. The smaller areas of white and Norway pine are mainly inaccessible at this time.

Carlos Avery says much of the western part of the tract consists of granite ridges with intervening swamps, lakes, and streams, making an ideal home for moose. The entire northern area is stony, and the numberless lakes, many almost unknown, teem with game fish such as lake trout, wall-eyed pike, black bass, rock bass, perch, pike, and sunfish.

In this primitive region man has interfered little with nature, for much of the land is accessible only by canoe, and the voyager there feels that he is in an almost unknown world. The moose and white-tailed deer are numerous and are often seen, while fur bearers and other wild life abound.

A WILDERNESS TO BE PERPETUATED

For many years on both sides of the border in this region game has been protected and its future seemed safe. More recently, however, plans have been made for exploitation of the area in ways that would ruin its scenic charm as a wilderness and would doom its wild-life resources.

The prospect of such a public calamity aroused conservationists, and under the leadership of Ernest C. Oberholtzer such a strong presentation of the situation was made to Congress that a bill was passed and approved by the President protecting the area within the Superior National Forest



FALLS ON UPPER LOON RIVER, MINNESOTA, MEAN A CARRY

From camp on top of the bluff there was a good view for two miles down the marshy borders of the river where moose came to feed. After a portage around the falls the party came to the head of canoe navigation only about a mile above, and the author flashlighted a large bull (see illustration, page 183).

from any exploitation that would destroy its scenic beauties or its wild life. This insures the return of royal dividends to the public in health and well being through the enjoyment of a superb wilderness.

WHERE MOOSE ARE PLENTIFUL

The State of Minnesota, under the wise leadership of Carlos Avery, then State Game Commissioner, made the Superior National Forest a State Game Preserve soon after President Roosevelt set aside the forest in 1909. This act has helped to maintain the wild life in a manner otherwise impossible, and has left it in a state worthy of the recent efforts to perpetuate this beautiful forest region.

For a long time after the first white settlers came to Minnesota, the woodland caribou was the principal big-game animal of this region, but through the general use of firearms and perhaps from other causes it gradually disappeared and is now found farther north in the Canadian wilds. Its place has been taken by increasing numbers of moose and white-tailed deer.

An indication of the abundance of these animals at the time when the Superior National Forest was established has been recorded by Mr. Avery. He saw 51 moose in three days of June, 1908, in the western part of the forest. In the fall of the same year a well-known hunter informed him that at one time he saw 28 moose within a quarter of a mile, near the eastern side of the area. In the course of the two weeks Avery and I were out on the trip described above, we saw more than 100 white-tailed deer and moose.

I fully agree with those who are thoroughly familiar with all parts of this region, that the destructive exploitation of such an unspoiled wilderness would mean a serious loss to the State, and the country as a whole, both from an economic and a recreational point of view.

A GREAT GAME CONSERVATIONIST

One of the outstanding results of my first visit into the Minnesota wilderness in 1909 was the beginning of a long personal association with Carlos Avery, who on the occa-

sion referred to acted as an official host on our canoe trip through the Superior National Forest. I had known in advance of the wonderful record made by Mr. Avery in matters of local game legislation and in the organization of sportsmen's clubs designed to support and enforce the best game regulations at that time in force in any western State.

So efficient was his work that he served as the head of the State Game Commission some 13 years, and under five governors of different political faiths. He thus succeeded in taking the game commission out of politics, and his success in doing so greatly strengthened efforts on similar lines in other States.

During this time Mr. Avery did pioneer work in obtaining legislation for the establishment of hunting licenses for financing his commission and creating game refuges both on public and private lands. He had the game laws codified, and from a handful of old-style wardens developed a highly efficient law-enforcement force. He originated the best system yet devised to obtain game statistics through hunting license reports.

On traversing the many inter-connecting lakes and streams of the Superior Forest in 1909, where marsh lands and virgin timber offered a wonderful retreat for moose, deer, and smaller game, I was able more quickly to visualize the value of Mr. Avery's successful efforts that culminated that year in having this wilderness set aside by the Legislature as a State game refuge.

CARLOS AVERY'S WORK WAS NATIONALLY RECOGNIZED

Mr. Avery's work in Minnesota attracted national attention. He was in constant communication with the game commissioners of other States, who came to him for information and advice. He was appointed by the Secretary of Agriculture a member of the Federal Advisory Board under the Migratory Bird Treaty Act, of which Board I was also a member. He served for many years also as an official in several national and international conservation organizations.

As the work of the American Game Protective Association became more extended and exacting, Mr. Avery was in 1924 elected its vice-president. This useful organization had achieved extraordinary results under



SHE ALMOST HIT THE CANOE

Out of the fog a cow moose came surging through the water so near that the hastily fired flashlight in her face prevented a collision. Camera hunting at night when mist cloaks the waterways has elements of mystery that appeal to the adventurer (see text, page 173).

the presidency of John B. Burnham, and under his efficient leadership had succeeded in having the original Migratory Bird Bill enacted into law.

On Mr. Burnham's retirement as president of the American Game Protective Association, the directors of the association, of which I had long been a member, unanimously elected Mr. Avery to the presidency. His untimely death in the summer of 1930, as the indirect result of an automobile accident, cut short a career of extraordinary promise in his new position. My own feeling was expressed by one of his associates, as follows: "In a most unusual measure Carlos Avery possessed the necessary elements for effective public service. No one gazed along the path of duty with clearer vision nor trod the way with finer conscience and steadfastness to lofty purpose."

Mr. Avery lived to see the long-delayed passage of the Game Refuge bill by Congress, and to see the wild life of the Superior National Forest and adjacent



MERRITT'S CAMP STOOD AT THE EAST END OF GUNFLINT LAKE

This was the author's headquarters during his second trip to northern Minnesota for wild-life pictures. He was accompanied by H. E. Anthony, who sought to procure a group of moose for the American Museum of Natural History.



A NOCTURNAL WANDERER REGISTERS AMAZEMENT

This large bull moose was flashlighted one night at the head of navigation on Loon River. He was rather more than mildly curious but not alarmed at the sudden explosion. Unusually low water forced the party to turn back soon after the picture was taken.



THIS WHITE-TAILED DOE FED LIKE A MOOSE IN DEEP WATER

On the Minnesota trip the author saw, for the first time, a deer of this species wading out until nearly submerged to browse on water plants. Such an occurrence is rare, for these animals are wont to live on browse in the forests. They seldom eat grass or other ground vegetation.

territory safeguarded by act of Congress, with the practical assurance that it would eventually become a national park and, by a treaty with the Dominion of Canada, a part of an international park.

Although long connected with public affairs and occupying many positions of im-

portance, Mr. Avery was one of the most modest of men among those leading an active career. His efforts were never dimmed by self-exaltation, and his goal was always a worthy and practical one. He was ever ready to give due credit to those who aided him or the cause for which he had enlisted.



CHAPTER VIII

Isle Royale and St. Ignace

ISLE ROYALE lies near the northwestern shore of Lake Superior, north of what might appear to be the natural course of the international boundary between Canada and the United States. The negotiations, however, ran the line north of the island, leaving it within our territory. Another interesting fact in its political history is that it belongs to the State of Michigan, far away on the south shore of the lake, although the easternmost point of Minnesota lies only about 25 miles from the westward point of the island.

It is the largest, most beautiful and most generally interesting island in the Great Lakes and has never had the attention it deserves. It is about 45 miles long and 8 broad at its greatest width, with a rocky and broken surface, well clothed with a forest growth that has been estimated to be 90 per cent balsams and spruces, with the remainder mainly poplar, white birch, pin cherry, and willow.

GRACEFUL WHITE BIRCH FOREST

Limited areas are covered with superb clear stands of white birch, some of these trees being reported to measure about two feet in diameter. Since white birches are almost always second-growth trees, these unusual areas of them on Isle Royale appear to indicate the destruction of the original forest by fires probably started by Indians many years in the past. Here and there are parklike open tracts.

Among attractive features of Isle Royale are the many lovely little islands that border its shores and the bays and harbors that indent its outline. The largest of these are Grace and Washington harbors at the extreme west end, Siskowit Bay on the southern shore, Rock Harbor, Tobin Harbor, Duncan Bay, and Stokly Harbor and Todd Cove on the northern shore.

The interior of the island is beautified by numerous ponds and small lakes and by several streams that wind through the rocky formations and stunted timber growth. Some of the streams are merely brooks, but others are little rivers, such as the Washington, the Little Siskowit, and the Big Siskowit, with deep, rapid currents.

The island is unsuitable for agriculture, for the surface soil is thin and poor, and its

remoteness even in recent years has caused it to maintain only a small population. At the time of my first visit, in 1885, it was uninhabited, except for a few trappers. When I was there again in 1918, two hotels and some cottages had been built for the benefit of summer visitors, while scattered cabins were occupied by commercial fishermen during the season. The permanent population, however, has not greatly changed.

The midsummer temperature of Isle Royale, beneath bright skies, is always cool and bracing. Surrounded by the deep, cool, clear waters of this vast lake, the island has a climate unequaled on any portion of the American Continent at the same altitude and latitude. It is doubtful whether the mean summer temperature exceeds 63 degrees.

When the torrid winds from the south or west put the temperature above 100 degrees in Duluth or St. Paul, the chilly waters about the island quickly temper this heat. As stated elsewhere, the same climate prevails along the north shore of Lake Superior and the greater portion of the south shore, where, however, an occasional land breeze brings a hot day or two with refreshing showers. Here is a retreat that should lure the sweltering multitude who live within a day's journey.

The winters are severe, because Isle Royale is near the western end of the lake, where the cold on the great continental plain in winter is more intense and prolonged than on the south shore. The surface of Lake Superior never entirely freezes over, but during exceptionally hard winters the western end of the lake surrounding Isle Royale is covered with ice, an ice bridge being thus formed between it and the mainland.

STORMS BREAK THE ICE BRIDGE

In ordinary winters this bridge is broken repeatedly by winds and currents, so that crossing it is a perilous undertaking. In very cold seasons, however, it may remain unbroken for a long time, as in 1912, when it continued during January and February.

In 1918 I made a complete circuit of the island, by boat, for the purpose of locating a desirable camping place to be occupied



MOOSE LAKE ON ISLE ROYALE IS A FAVORITE RESORT FOR MOOSE



Photograph by W. E. Hastings, Michigan Conservation Commission

HALF STARVED, IT HAD TO BE CARRIED TO NEW FEEDING GROUNDS

A young moose caught by the Conservation Commission, in 1929, was one of many transported to the main shore of the State to relieve the overstocked condition of the island.



ISLE ROYALE MOOSE SEEK FOOD AND REFUGE FROM FLIES

the following year. Unfortunately, my plan was not carried out, and my personal contact with the animal life there has been less than I desired. In 1926 Frank M. Warren published an excellent account of the wild life of the island, based on observations during many consecutive seasons. Free use has been made here of the information available from this and other sources.

ORIGIN OF WILD LIFE ON ISLE ROYALE

From the character of the wild life on Isle Royale it seems probable that the mammals, with the exception of the white-tailed deer, have all individually found their way there from the mainland since the retreat of the glacial ice cap that covered this region. In addition to the many moose and formerly a few caribou, the fauna of this island includes the coyote (locally known as brush wolf), Canada lynx, mink, weasel, red squirrel, beaver, muskrat, and snowshoe rabbit.

The species notable for their absence are the gray wolf, black bear, skunk, otter, marten, fisher, wolverine, porcupine, and chipmunk, all of which are well known on the neighboring mainland. The caribou formerly there may now be classed as absent from the island.

Neither beavers nor muskrats are very numerous. The beaver seems to depend on the poplar or aspen for food, and cuts down trees up to 18 inches in diameter. Mr. Warren found muskrats opening and eating fresh-water clams on the rocky shore in front of his camp. The muskrats there do not make "houses" but dig burrows in banks.

One hundred and twenty-two kinds of birds have been recorded on the island, and 42 kinds are known to have nested there. During the two trips I made about the island the herring gull was the most common bird seen, and smaller numbers of the great northern loon, red-breasted merganser, osprey, and a few of both the golden and the bald eagles were noted.

Among the residents on the island are great horned owls, ravens, and crows. Sharp-tailed grouse in small numbers have occupied some of the open, treeless areas, but their foothold is precarious of late. The smaller birds found there, as is the case with the larger ones mentioned, are those common to similar country of the adjacent mainland.

At the time of my first visit to Isle Royale, in 1886, I neither saw nor heard of any moose there. Later, perhaps at the



THIS COW MOOSE IS FEEDING IN A LAKE ON ISLE ROYALE

Photograph by Frank M. Warren

The photographer records that when these animals submerge their heads they fold their ears down to exclude the water. After three or four plunges their sense of smell is momentarily impaired (see text, page 189).

time of the ice bridge to the mainland, the winter of 1912, they appear to have colonized the island and found conditions so favorable that they increased with amazing rapidity. Some years later the number on the island was estimated to exceed 2,000. This aroused much public interest, and agitation began to have Isle Royale made a State or national park in order that these great animals might be perpetuated in such an easily accessible and beautiful wilderness.

Albert Stoll, Jr., of Detroit, was one of the early and earnest advocates of this conservation movement, and in December, 1921, I wrote him, in part, as follows:

"State or national game preserves offer the most practical solution for the perpetuation of certain species of large game where they can always be seen and studied to advantage. Your suggestion that Isle Royale be acquired as a State or national park appeals to me particularly, for it is an ideal location, and, being an island, to a great extent it would be free from trespass or changes in natural conditions through the encroachment of civilization."

In March, 1931, Congress authorized the establishment of a national park, including the entire island and neighboring islets, dependent upon title being secured to private holdings within its limits without cost to the Government. The State of Michigan appointed a commission to do this but, so far as I can learn, little or no progress has been made.

A later and more careful consideration of the problem leads me to the definite conclusion that Isle Royale is better adapted for a State park than a national park. A still better plan might be to create a Tri-State park consisting of land in Michigan, Wisconsin, and Minnesota. It seems to me that overcrowding this small wilderness retreat with discontented tourists from distant points, would be as deplorable as the overcrowding of moose on the island.

MOOSE AND THEIR MAINTENANCE

As already stated, moose are believed to have come first to this island in the early winter of 1912, over an ice bridge from the mainland from either Minnesota or Ontario.

The same year the State Conservation Commission placed nine white-tailed deer there. Apparently the moose found conditions on the islands far more suited to their needs than did the deer, for they increased

remarkably, while the deer seem to have become extinct.

Although the general conditions originally have been favorable to the moose, Warren observed that they are terribly harassed by flies in summer. The extent of their suffering from these pests during the worst of the fly season is indicated by the raw and bleeding condition along the backs of their hams, where the hair is short.

Warren was so impressed by the torment inflicted by the flies that he expressed the belief that the moose passed much of their time in the lakes and ponds for relief from the tormentors, even more than for the purpose of eating the succulent water plants of which they are so fond. He saw the moose, when swimming the lakes, from time to time sink entirely below the surface for 10 or 15 feet, and, on coming up, shake their heads as if to dislodge the flies that swarmed about them.

MUD COAT Baffles FLIES

During the day, when flies are very bad, moose often submerge their entire bodies in deep, tenacious mud that forms a coating over them. The mud for a time is a protective armor against even the most aggressive deer and horse flies.

In summer the moose feed to a great extent on water plants growing from a few inches to more than seven feet below the surface. In getting the plants growing in deep water, they keep their heads under water from 30 to 50 seconds at a time. Warren states that as they submerge their heads they bend the ears down to form a sharp angle at the base that closes the opening of the outer ear and thus excludes the water. In winter these animals are dependent on browse supplied mainly by the balsam, poplar, white birch, pin cherry, mountain ash, alder, and willow.

Visitors' frequent references to moose "wallows" seem to be based on a misunderstanding. Many of the "wallows" appear to be well patronized salt licks.

In August, 1931, a party of my friends sailed to the island in a trim little schooner. One night the party camped in the interior near a "wallow" beside a stream. Here they were disturbed throughout the night by the coming and going of moose that waded about in the shallow water and engaged in butting contests. These animals apparently had come to satisfy their craving for a saline stimulant not prescribed by



EMACIATION OF MOOSE RESULTS FROM OVERSTOCKING ISLE ROYALE

The condition of this cow is caused by the lack of food and the harassing flies. The animal has just raised its head from feeding on plants beneath the water.

the Volstead Act, for flies do not bother them at night.

Salt licks are excellent locations at which to photograph moose, both by daylight or flashlight, although the last-named method apparently has not been used in such places up to this writing.

Nearly all the larger islands in Lake Superior have such salt springs wherever the basal metamorphic rock is capped by sandstone. It has long been my opinion that beneath some of the more extensive sandstone deposits natural gas or oil might be found, especially along the mainland shore. In Alger County, where my permanent camp is located, I have found a little oil on several of the small streams.

THE MOOSE PROBLEM

For years Isle Royale has been a State game preserve where all shooting is illegal. The rapidity with which the moose increased after the island was colonized by them has been mentioned, and for a long time very few of them could have been killed by poachers.

Being personally familiar with the deplorable history of the white-tailed deer on Grand Island and the moose on St. Ignace Island, both in Lake Superior, and with that of the mule deer on the Kaibab Plateau in Arizona, under conditions similar to those confronting the moose on Isle Royale, I deemed it obvious that unless definite constructive measures were taken to eliminate

the surplus, a calamity such as had befallen game animals in some other localities threatened these animals, and soon they would be likely to perish from starvation.

Previous to 1929 I published statements to this effect. In that year it became apparent that the situation I feared was developing even more rapidly than anticipated. From a correspondent I learned that during the summer of 1929 a survey of conditions on the island revealed abundant evidence of serious overbrowsing which, from the appearance of the forest, must have been going on for several years. Summer photographs showed that much of the undergrowth had been destroyed, such as ground hemlock, and that many of the aspens, conifers, mountain ash, and other small trees on which the moose fed had been denuded of branches up to a height of eight or ten feet, as high as the bull moose can reach and well beyond the reach of the cows and calves.

In the course of the survey were found a number of dead moose that apparently had perished from starvation the preceding winter. The surviving moose on the island were then estimated to number about 1,000. Mute testimony to their former abundance was given by trails several inches deep in places. The island has never had the variety and abundance of vegetation to be found generally on the mainland, and thus the supply is more easily exhausted, with greater time required for its restoration,

especially since the distribution of pollen and seeds is more restricted than in larger areas elsewhere.

The same situation applies to the absence of many forms of animal life common to the adjoining State which, like certain plant life, never got a foothold on this isolated and rugged isle.

Under such conditions the practical remedy would have been to make a prompt study of the situation and then reduce the number of both male and female moose until the number of survivors was such as the forage production could carry readily while the injured vegetation might be replaced. This was not done, however, and nature, probably aided by poachers from the mainland and residents on the island, with the coyotes, appears temporarily to have relieved the situation.

MOOSE DECREASING RAPIDLY

During the winter of 1931 Mr. Walter E. Hastings and Mr. Ben East, of the Michigan Conservation Commission, visited Isle Royale with an airplane and made a careful and thorough survey to determine the approximate number of moose. They were amazed to find the animals much less numerous than they had expected. They worked the island by airplane and on snowshoes and finally estimated that the island contained only about 500 moose, which lived mainly on the then plentiful white birch.

Reports from Isle Royale toward the end of 1934 indicate that all the ground hemlock has been browsed to the roots and that all the mountain ash trees have been destroyed, as has most of the other deciduous growth. These reports state also that the balsam has been browsed beyond reach. Even should a good supply of balsam remain, I doubt that it alone could carry moose through long, hard winters.

The first manner in which the results of insufficient food will appear will be in the increasing sterility of the cows and the loss of most or all of the few offspring during the severe winter months, when only the larger or stronger animals find food within reach. At this stage the herd would have become nearly stationary, there being a slight continuing decline of animals dying of old age, disease, or infirmities caused by lack of sufficient nourishment.

Such loss would finally reduce the surviving moose to 100 or 200. Then nature might assert itself again in the restoration

of some of the vegetation. There would be a renewed increase of the herd. Then once again the cycle of starvation would set in with its consequent recession in numbers.

All experienced stock breeders and field naturalists are familiar with these conditions, and in their opinion they are supported by mathematical and biological calculations. Such conclusions should be supported by every rational conservationist.

It matters not whether an island refuge be 10 or 50 miles long and perfectly adapted in climate, food, and shelter for an initial herd of moose, its unfortunate end, under continuous protection from the gun and predacious animals, can be definitely predicated. Such an outcome is little realized by the public at large.

When the trees on Isle Royale are trimmed beyond reach, these trees may live for 50 years or more and never produce a single ounce of available food. When the ground vegetation is cropped too closely throughout most of the year, the roots die. Then the seedlings of forest trees are quickly destroyed in spring by the hungry animals, and thus is prevented a sapling growth that furnishes the bulk of the forage of browsing animals.

Unlike deer, moose are exceedingly destructive to water plants, especially the lily, which they tear up to get at the white suckers on the heavier roots. Thus it is apparent that a large and ever-increasing herd on an island too far from shore for any well-defined migratory movement is bound to starve eventually, simply because there are more mouths to feed each year when the food supply is decreasing.

SENTIMENT OFTEN MISGUIDED

One serious obstacle to carrying out any program to reduce surplus big game from any refuge or reservation will be the objections that may be raised by many well-meaning people who really desire to perpetuate wild things. Having no knowledge of the factors limiting the lives of these creatures, they often oppose measures that are imperatively necessary for the welfare of the animals they wish to help.

By such ill-advised attitudes they may easily become more harmful than some of the worst enemies of wild life, for successful conservation means the exercise of the practical common sense necessary to the successful handling of domestic animals.



THE FISHING CAMP AT SISKOWIT BAY HOUSES MOST OF THE WINTER POPULATION

Isle Royale has been for years a wilderness area. It is visited by a few vacationists in summer, but in winter it is virtually deserted. Plans to make of it a national park have met with little success (see text, page 189).



A SIOUX LODGE HAS BEEN ERECTED NEAR TOBIN'S HARBOR, ISLE ROYALE

In former days the Sioux Indians occupied all this region. This reproduction of one of their typical teepees stands on a rocky point. Its architecture contrasts strikingly with the Ojibway house shown in Chapter I.



CAMP ON ST. IGNACE ISLAND FACED 160 MILES OF OPEN WATER

Many medium-sized speckled trout were taken within 100 yards, but most of the larger fish became the victims of a gill net extending out from the shore. This ostensibly was set for lake trout which inhabit deeper water.



ST. IGNACE HAS MANY BEAUTIFUL LAKES

Four miles long and nearly dividing the island is the largest of some fifty bodies of water. The western shores are high and rocky and the eastern low, with shallow bays. There the author saw 40 moose in two days.



Photograph by Paul Swift

HE WAS DISTURBED AT HIS MEAL

When first seen, this fine old bull moose was feeding on water plants in about eight feet of water in a large lake on St. Ignace Island.

**IN DISGUST HE DEPARTED HASTILY**

When the canoe approached, he swam for shore at such speed that it required all the exertions of three paddlers to keep abreast of him.



ST. IGNACE ISLAND AFFORDED DELIGHTFUL SURROUNDINGS FOR CAMP SITES

The camp on the beach here was backed by a fine forest of spire-topped spruces which, unlike the balsam, had not lost their lower branches by browsing moose.

Information received by the author from the Michigan Department of Conservation has disclosed that the unusually severe winter of 1933-34 and a heavy snowfall destroyed all the younger moose and that only about 75 adult animals survived.

ONLY QUICK ACTION CAN SAVE THE HERD

If some thousands of acres be planted with seeds and seedlings, this second growth will amply suffice for maintaining a small herd. These animals will pass most of the long summer days about the ponds and lakes in order to escape the flies and to feed on the water vegetation.

At such times ample opportunity will be afforded for visitors to see them in good condition. A small number in health is much better than a larger herd continually facing starvation.

Up to within 40 years ago speckled trout ranging from two to four pounds in weight abounded about the rocky shores and in several streams of Isle Royale, but now their numbers are greatly reduced because of overfishing by unethical methods. Lake trout are caught in considerable numbers by commercial fishermen and by sportsmen using trolling lines.

Although the fish caught by trolling are usually much smaller, some have been taken weighing more than 40 pounds. In the bays and long, narrow channels bordering the island many northern pike are caught, and in the small lakes are found pickerel and sunfish. Black bass are not indigenous here, but they should of course be introduced.

Of the larger lakes in the interior of Isle Royale we find Lake Feldtmann, about two miles long and a half mile wide; Lake



INTERLOCKED MOOSE ANTLERS TELL OF TRAGEDY

This enlarged view shows in curious detail the complicated manner in which they became inextricably entangled, causing the death of their possessors. The males of both elk and deer also perish in this same manner.

Desor, two and a half miles long and a mile and a half wide; and Siskowit Lake, six miles long and a mile and a half wide. In the eastern interior of the island are a number of smaller lakes ranging from one mile long and a half mile wide to little bodies of water usually called ponds.

In the establishment of wilderness parks it is essential that those forms of outdoor recreation suitable to each section should be developed to the greatest possible extent. The rugged and primitive character of Isle Royale should never be disturbed by automobile highways, but a series of trails should be built from the shore line to many of the interior lakes and ponds where log cabins and canoes will invite camping parties. Here amid delightful surroundings such outings will present a strong appeal to many who wish to escape from the great tides of humanity that sweep through many of our national parks.

Unless these interior waters are well stocked with the best species of game fish adaptable to each, one of the great incentives to draw visitors to such a wilderness camp is lost. Moreover, the netting of lake trout by commercial fishermen should be

prohibited within five miles of the island, thus affording not only excellent trolling for these large game fish, but the use of a light rod and spinner for those who wish to exercise their dexterity in bringing within reach of the gaff or landing net fish varying from two to 40 pounds in weight, and capable of putting up a contest worthy of the effort.

It may be said that to oust the local commercial fishermen from their little cabins, often occupied by several generations of these hardy visitors, might entail a hardship. But this situation can be remedied. Instead of hundreds of thousands of pounds of trout being shipped each season to Chicago or more distant points, and the island thus being deprived of one of its greatest recreational assets, the fish should be retained for the benefit of the summer visitors.

In such a plan the fishermen who have been deprived of their summer vocation could find lucrative employment as guides, for their extensive knowledge of the fishing waters would create a demand far beyond the number now employed in the fisheries. Besides they would be given the



Photograph by Paul Swift

THE FLEEING MOOSE BROKE THE SPEED LIMIT

As the big bull (see page 194) got a footing, he tore through the water until it foamed about him, and then he dashed through the shallows in a cloud of spray and disappeared into the forest. These pictures were taken with a small camera by one of the anglers of the party.

opportunity to build and lease to those who desire such accommodations many cabins along the wilder portions of the shore.

Isle Royale has long been of interest to the geologist and archeologist. "Minong" was the name given by the Indians to this island. Translated, it means "The Place to Get Good Copper."

Whence came this name for Michigan's northernmost island? How long ago and how thoroughly was Isle Royale mined? And by whom were those first crude pits hammered out of the rocky ledges of the great islands?

INDIAN ANTIQUITIES

An examination of these ancient pits—the crude hammers, and places where copper had once been refined by great fires built over the broken rocks upon which later cold water was thrown to shatter them—revealed evidence of primitive mining operations of an unknown and ancient race.

Fragments of Indian pottery marked with many incised designs can be found in many parts of the island, some of it of prehistoric origin. When I first visited Isle Royale, one of the most interesting

things for the visitors to do was to search for green-stones, of a semi-precious character, to be found in large quantities scattered along the shores and found nowhere else in the world. It reminded me of my boyhood days when hunting for arrow heads along the banks of the Ohio River.

These stones are technically named chlorastrolites. Not only do they make handsome settings for rings and pendants, but also, when cut and polished, they demand fairly good prices in commercial marts. The gathering of the stones is a fascinating pastime replete with surprises; for one never can tell at what moment one may chance upon a particularly beautiful specimen.

Great quantities of these stones have been gathered by tourists and visitors to the island. The waves of Old Superior seemed to take delight in washing up on the shore of the island a new supply every season. Of late years, however, a marked decrease has occurred.

In 1895 a former guide of mine and a companion visited the island in quest of green-stones. In 10 days they had so loaded their little sailboat that it was hardly afloat when they started with a



RIVALS WERE JOINED IN DEATH

These interlocked antlers, each having a spread of 50 inches or more, were found near the middle of St. Ignace Island. They were a mute record of a deadly combat during the mating season, when both animals perished from exhaustion.

light wind for the main shore. Several miles out the boat sprang a leak, and in a few minutes went to the bottom, leaving the occupants struggling in the water where they would soon have perished had not a fishing boat arrived just in time to rescue the treasure hunters.

A few of these handsome stones, together with agates, are still to be found scattered along the shore. On quiet days some can be noticed glistening on the reefs or imbedded in them, for the water is so clear that they can be readily seen 20 or more feet below the surface.

With the conversion of the sailboats of fishermen and of private individuals into motor launches, a sail is a rare sight on Lake Superior. To the eastward, about Detroit, Chicago, or Lake Erie ports, there are a number of yacht clubs, but where Lake Superior pushes its way well into the west yachting is almost unknown.

ISLE ROYALE AS A YACHTING CENTER

Isle Royale, with its many bays and fine harbors and long, broad sheltered channels bisecting the island here and there, is a most suitable place for yachting in its various forms.

With nearly 200 miles of beautiful shore line, ample cruising facilities exist, while the long channels are ideal for racing speedboats from the most powerful down to the outboard motor type. A midsummer tournament for yachtsmen would attract many thousands and would give the West a chance to see or participate in these gatherings.

ISLE ROYALE EASILY OVERCROWDED

Over-enthusiastic propagandists have declared that Isle Royale should be as popular as our other great national parks, such as the Yellowstone. These Rocky Mountain national parks are visited by tens of thousands each month, for their gateways are reached by railroads and other highways, leading to an almost continuous procession of automobiles and motor busses along the several hundred miles of fine roadways, where a week's itinerary suffices for most visitors.

Isle Royale should have no automobile roads or other means of vehicular traffic. It should be traversed only on foot or horseback or by boats cruising along the shores. Good trails can be made for transporting canoes and camping outfits to the interior lakes.

This island is ideal for those who wish to pass a part or all of the summer vacation in a leisurely way. With ample hotels, private cottages, and camping places, with excursion boats from Marquette, Houghton, Duluth, and Canadian towns, any special celebration can be provided for.

Along the north shore of Lake Superior, diagonally opposite Marquette, is an interesting and beautiful group of islands, the largest of which, St. Ignace, occupies the entrance to Nipigon Bay, into which flows the most famous of Canadian trout streams.

On a trip west of Port Arthur, made in 1916 for the purpose of studying the moose along the international waters between Minnesota and Ontario, I was told that several of the larger islands near the Nipigon contained an incredible number of moose, but as at this point the line of the Canadian Pacific follows the shore in sight of the islands, the report seemed somewhat doubtful. During the following year, however, I decided to investigate, for, with the exception of Isle Royale, none of the islands had been authoritatively reported as haunts of moose.

It may be noted in this connection that for some years after I came to Lake Superior moose and white-tailed deer were unknown on the north shore, although caribou were abundant, especially in the fall and winter. About 1885 a steady movement of the moose westerly from Quebec was observed, as well as a slower easterly migration from northern Minnesota. Eventually these animals commingled and took possession of the entire north shore, later extending northward into the interior until they reached the waters flowing into Hudson Bay. After the moose, came the white-tailed deer and many timber wolves. Then the caribou began yielding the territory it had possessed for centuries.

After the construction of railroads, extensive lumbering and many forest fires changed the face of the country, and large clearings and a mixed second-growth vegetation succeeded the dense evergreen forests. To this change principally may be attributed the influx of new animals and birds. Since most of this land is not suitable for settlement, a permanent and widely extended range is insured for some of the big-game animals that have suffered eviction in districts valuable for mining or agriculture.

THE AUTHOR GOES IN SEARCH OF MOOSE ON THE ISLANDS

In September, 1917, our party arrived at Rossport, a little fishing village between the railroad and the bay opposite Simpson's Island, next in size in this group to St. Ignace. Here we obtained provisions and canoes, and a few hours later the little tug was on its way, the party alert to detect the first island moose. The pilot had given assurance that before we reached the camp site we should see several.

While we were passing through the broad channel separating the two larger islands named, we noted three moose well out in the shallow water at the head of a long bay. This was the first time in my experience that I had found any such game animal feeding in the waters of Lake Superior. Because of its depth and temperature, the lake contains little aquatic vegetation.

Along the winding shores was a great variety of second-growth trees, such as poplar, cherry, birch, soft maple, mountain ash, and balsam, all particularly

suitable as browse for moose. Interspersed among these were dense forests of spruce that offered a safe retreat from the hunter and an excellent shelter in winter. The spruce is the only tree in this region never eaten by moose or deer.

The apparent abundance of available browse was misleading, however, for it was now seen as we drew near in the boat that for some ten feet above the ground all the lower limbs of the trees referred to had been eaten or destroyed by the animals. This fact accounted for the moose just seen in the shallow water of the bay, where the higher temperature permitted an unusual growth of water plants.

Unlike Grand Island, with its precipitous cliffs to the north, most of the exposed shore of St. Ignace Island is low and cut by many bays separated by narrow, rocky points affording suitable camping places, where reefs and shallow waters seem favorable for excellent trout fishing. Inland are high, rounded hills approaching an altitude of 1,500 feet, and several rocky ridges that divide the island into many basins filled with the purest water, ranging from ponds of an acre to a lake four miles long, and totaling nearly 50 on an island about five by ten miles in extent.

THE PARTY WATCH FOR MOOSE AT THE SALT LICKS

The tents were pitched on a level bank in a well-sheltered grove, at the edge of which flowed a fine trout stream leading from the largest of the interior lakes (see page 193). Our camp faced the widest part of Lake Superior, and we passed most of our time looking for moose in near-by ponds or watching for them at several natural salt licks in a deep valley behind the camp.

These salt licks had been discovered by two members of the party 15 years previously, when a yacht in which they were cruising ran on a reef. While they were awaiting the assistance of a tug, they visited the island, where numerous caribou tracks about muddy pools indicated the presence of salt springs. It was due to this information that we expected to find the moose as successors to the caribou at these resorts. Our calculation proved correct. What the camera captured is best told by some of the accompanying illustrations.

In a week we saw 15 moose, all apparently depending upon water plants for

food. The numerous ponds and lakes yielded a sufficiency, though often the animals were forced to feed in water well over their backs, as they dived out of sight in search of them. Only on the face of inaccessible cliffs was the vegetation undisturbed.

Under existing forage conditions no moose could have survived the winter on the island and they must have crossed to the mainland in the fall and returned in the spring. This they could not do on Isle Royale. In a patch of spruce we discovered two large pairs of interlocked moose antlers. The animals in the fierce rivalry of the mating season had gone down forever in mutual defeat (see page 196).

INHABITANTS KILLED MOOSE ILLEGALLY IN WARTIME

At the time of our visit no one was living on any of these islands, but nearby inhabitants of the mainland supplied themselves with moose meat from them regardless of the law, justifying this action because of war conditions existing at that time. At a salt spring several hundred yards back of the camp I located the first blind, where it was distressing to see a four-year-old bull moose lying dead within 30 yards, killed only a few hours before and abandoned because of our proximity. Here, festering in the sun, it soon drove away any of its surviving associates.

Several days later we placed another blind opposite one of the best natural licks I have ever seen, situated a mile up the stream from the first. Here the moose during many years had dug out a large clay basin, into which trickled a salt spring from the adjoining bank, the mixture resembling liquid mortar. Every time we passed the place, one or two moose would dash hurriedly away, but a trial in the daytime showed that our scent circled toward the lick, covering every approaching runway and consequently daylight photography was impossible.

We set up a flashlight and camera, and on the night following a large cow moose took its own picture at a distance of 15 feet (see opposite page).

On several neighboring islands the moose were numerous, and tracks proved the presence of a few caribou. All these animals visited licks similar to those on St. Ignace. On the opening of the hunting season, the same fall, one party of five from Port Arthur killed their limit of five big bull



A SET CAMERA AND FLASHLIGHT RECORDED THIS NIGHT PICTURE OF A COW MOOSE

She is standing in a basin five feet deep which has been made by the animals eating the saline clay (see text, page 200). On analysis the water in this pit proved to contain calcium oxide, magnesium oxide, potassium chloride, chlorine, and sodium. The undergrowth and lower branches of the trees in the background have disappeared from too much browsing as in most parts of the island.

moose on the first day of the hunt, the antlers ranging in spread from 48 to 54 inches. The question uppermost in my mind is whether any of the fine bulls pictured in this chapter furnished some of these trophies.

I saw no signs of white-tailed deer on any of the St. Ignace group of islands, although they were common on the near-by mainland. Their absence was due no doubt to the destruction by the moose of all the browse. Only the water plants growing deep in the small lakes were left. This condition probably accounted for our having seen only a single moose calf. In such a denuded location calves would soon perish in the fall when their mothers' milk failed them.

CARIBOU ABOUT LAKE SUPERIOR

The only instance of the occurrence of caribou on the south shore of Lake Superior that came to my personal attention was the account given me by my old Indian guide, Jack La Pete, of a small band of about half a dozen, all of which he shot, about

12 miles southeast of Marquette, in 1865. Much later came two introductions of small bands on Grand Island, where conditions were so unsuitable for them that they soon perished.

NORWAY REINDEER SOON PERISHED

Later still, early in the present century, the State Conservation Commission introduced a considerable band of the depauperate domesticated reindeer from Norway with a view to stocking the forested area of northern Michigan with them, but the heavy snows and lack of suitable food soon eliminated them. Such caribou as formerly occurred in northern Michigan undoubtedly came in by crossing the Sault Sainte Marie at the east end of Lake Superior in winter.

The abundance of caribou on the north shore of Lake Superior, especially in fall and winter, is recorded in early historical accounts of that region. In the course of my several summer visits to the mainland opposite St. Ignace Island, as well as on this and adjacent islands in 1897, I saw



A COW MOOSE VISITED SALT SPRING, ST. IGNACE ISLAND

The saline water came from beneath a layer of red sandstone a few hundred yards back of camp. A bull moose had been killed and abandoned at this lick just before the arrival of the author and his companions, and its festering body soon drove the other animals away.



CANADA INSISTS THE MOOSE SHALL NOT PERISH

More than 150 of the animals were counted here on St. Ignace Island by the photographer in one week in summer. This island, in northern Lake Superior, just off the mouth of Canada's famous trout stream, the Nipigon, is a natural paradise for the moose.



THIS LARGE BULL WAS PHOTOGRAPHED AT SALT SPRING, ST. IGNACE ISLAND

On the same day the author obtained the picture of the cow shown on page 202. The camera hunting on the trip left little to be desired.

many signs of them. These were most in evidence on the faces of cliffs fronting the water where the animals had walked on the ice in winter along the front of the rocks, and eaten the lichens from places inaccessible at other times.

Caribou had left their signs also among the rocks bordering small inland lakes, where they had pawed away the snow and eaten the lichens. About the year mentioned they visited regularly the large Simpson Island, east of St. Ignace, attracted by a salt lick, and were shot there by the people living on the neighboring mainland. A single caribou was seen in the summer of 1930 in the shallows near the shore of a small island in the St. Ignace group, but such an appearance was a rare occurrence.

After the extension of lumbering operations along the north shore of Lake Supe-

rior, great areas became covered with deciduous second-growth forest, which in turn attracted white-tailed deer and moose that extended their range throughout the region. Nearly all the caribou moved farther northward, for they appear to have a marked antipathy to the whitetails.

Just as the south shore has been almost depleted of its trout by fishermen taking them at the mouths of all the spawning streams during their fall migration, similar conditions now prevail on the north shore. The practice of running gill nets out from the beach, ostensibly set for lake trout and whitefish, results in taking all speckled trout exceeding two pounds in weight, and soon only the Nipigon, always under rigid government supervision, will remain stocked with these fine game fish.

A fishing treaty with Canada will greatly lessen this destructive practice.

CHAPTER IX

The White-Tailed Deer of Northern Michigan

THE deer of this region belong to one of the several geographic races that varying climates and other surroundings have developed in the species generally known as the Virginia, or white-tailed, deer (*Odocoileus virginianus*). At present this species is the most widely spread of the deer kind on this continent. It is known from the Atlantic coast to the east slope of the Sierra Nevada and the Cascades, and from southern Canada south to the Gulf States and far down into the tropics.

It will no doubt continue indefinitely in much of this territory if given reasonable protection, for it is the most astute and adaptable and one of the most prolific of deer. It is the favorite game in the United States probably of more sportsmen than hunt any other game animal in the world. Despite this persecution, the whitetail is so adaptable that it responds promptly to protection, and thousands of surplus animals are killed each year within a radius of 300 miles of New York City.

I have had an extended experience with different races of whitetails, from Canada to Central America. The present account, however, relates mainly to the animal of the Lake Superior region.

The larger bucks in upper Michigan have developed longer legs than representatives of the species elsewhere. To me it seems likely that this peculiarity of anatomy is the result of gradual adaptation to environment. Living permanently in a region of deep snows, they need long legs to get a footing and to escape pursuit by timber wolves by leaping over logs or windfalls.

WEST VIRGINIA DEER SHORT LEGGED

That the whitetail of the lower Allegheny Mountains in West Virginia has unusually short legs supports my theory; for there the deer's only safe retreats from hounds or man are dense laurel thickets, where many runways pass under gnarled limbs only a foot or two above the ground.

The unlimited killing of deer by pot-hunters in the years following 1881 greatly decreased their numbers in northern Michigan, but the stopping of the sale of game, the reduction in season and in bag limits,

the buck law, better enforcement of other laws for their protection, and an official war on wolves, have resulted in their marked increase. The final step to insure the perpetuation of deer in considerable numbers in northern Michigan will be the establishment of moderate-sized game refuges such as are so successful in Pennsylvania.

In 1870, when I first went to the Marquette region, whitetails were almost unknown on the north shore of Lake Superior, where they have since become abundant. Moreover, few were to be found within a mile of the south shore, because the ever-present Ojibways, so aptly called "Canoe Indians," camped in summer at the mouths of nearly all streams and in other places likely to be frequented by deer.

DEER SUMMERED NEAR LAKE SUPERIOR

When the country to the south began to be settled, most of the deer passed the summers near Lake Superior, stopping mainly about the small interior lakes and the headwaters of the numerous streams to which the Indians seldom went except in winter. My early visits to Whitefish Lake brought me into contact with these conditions.

The fact that approximately eighty thousand deer were killed each year in 1879, 1880, and 1881, most of them within 10 miles of Lake Superior, shows their extraordinary powers of increase. For some years after that time there was a gradual decline in their numbers, largely because of the great increase in hunters and the greater facility in reaching remote places.

Every summer and fall I passed at least a part of each week with young companions camping on the south shore, traveling usually in a big, staunch rowboat, often with a canoe in tow. Trout fishing was at its best along the open waters, many of the fish being of great size, while in the streams were brook trout, often preferable for the frying pan. Wild pigeons unprotected by the law frequented the burned-over clearings near the shore. Ruffed grouse were numerous in the same localities.

Hardly a day passed when we were near enough to a lake to portage our canoes to its waters that we could not kill a deer.



THIS BUCK WAS EXCEPTIONALLY LARGE

It was killed one mile west of Whitefish Lake Camp, in the fall of 1895. It weighed 275 pounds as it fell and the antlers had a spread of 25 inches. The adult males of the species about Lake Superior usually shed their antlers by the first week in January, and these, falling on damp ground or in the snow, gradually soften and are eaten by several kinds of rodents.

Referring to the seasonal migration of wild creatures brings to most persons thoughts of several large groups of birds that every year go to and return from their breeding grounds in the North. The fur seal and certain fish, like the salmon and shad, are also migratory, as well as some insects, including certain butterflies. Among the game mammals of our continent only the buffalo and caribou can be regarded as true migrants.

Some species of the deer family, however, such as the elk and mule deer of the Rockies and the moose of Alaska, regularly ascend in the spring to higher grounds for better

food or to escape insect pests, and return again when deep snows or killing frosts make the lowlands preferable.

Such movements, though well defined and participated in by hundreds, and sometimes by thousands, of animals, are usually altitudinal, and not latitudinal, and therefore are not deemed migratory in the accepted sense, because they are too irregular in time and direction.

On the south shore of Lake Superior, including all of northern Michigan and Wisconsin, there once existed a spring and fall movement of the white-tailed deer that possessed all the characteristics of a true migration. This habit was abandoned more than 45 years ago, after continuing for centuries.

Early in May, as soon as the depth of the snow permitted travel, thousands of does worked their way north from their wintering ground near Lake Michigan or

into Wisconsin, traveling alone into a broad belt a little back from the south shore of Lake Superior, where a few weeks later the fawns were born. The bucks came more leisurely, but by early May the migration was over.

Sometimes as early as August 15, on the coming of the first heavy north winds and light frost, the does, fawns, and yearlings started south, and by September thousands were on their way, regardless of the fact that no snow would fall for six weeks, and none deep enough to interfere with the food supply or freedom of movement for more than three months.

I well remember my old guide, Jake Brown, who for many years wintered at or near my camp, saying that if he did not get his venison under the snow by Thanksgiving Day he "would not have a chance for meat again before the middle of May."

In a few instances deer "yarded," trying to winter near the lake, but such animals were promptly killed either by the wolves or the Indians. Since the erection of barbed-wire fences along the railroad definitely ended the migration of the whitetails from northern Michigan, they have been forced to "yard" on a considerable scale and are thus exposed more than formerly to the peril of wolves and lawless white hunters who have replaced the Indians in year-long destruction of game.

Doubtless the great depth of snow in this region was the original cause of the fall migration of the deer, and the habit had finally become so fixed by inheritance that long before there was any apparent necessity, the retirement took place. The deer traveled southward on many trails, which by centuries of use had become about two feet broad, clear of obstructions, and deeply cut in banks and soft ground. In swamps they were like the caribou trails found in Newfoundland.

The fall migration was always in the form of a drift before a cold northwesterly wind. Whenever in the progress of the migration such a wind ceased or veered so as to blow from the southward, the deer at once stopped traveling. This phenomenon was



A RELUCTANT SUBJECT TURNED HIS BACK

This buck was so large and had such a great set of antlers that in the dim light it appeared almost like an elk. It must have weighed about 300 pounds. As the canoe approached, the animal was disturbed by the jack-light and continued to move away. It was photographed just as it was wading through the shallows about to step ashore.

so well known among the ambush hunters that they promptly abandoned the hunt as soon as the favoring wind ceased. The migrating deer always traveled in the daytime, usually between 7 a. m. and 4 p. m.

It is interesting to compare the migration of the caribou in Newfoundland, where I passed two seasons studying it. There, too, the cows, calves, and yearlings began moving southward about August 15, but usually in bands of a dozen or more, followed later by the large stags. Like the deer, they traveled in the daytime, but always against the wind except during severe weather and at the end of the season. The whitetails



THOUSANDS OF MIGRATING DEER FORMERLY CROSSED THE RAILROAD HERE

The building of wire fences along the right of way with the increase of lumbering operations and development of farming brought this seasonal movement to an end. The hunters either built scaffolds in trees along the ridge or concealed themselves at the crest of the cut (see text, below).

traveling south alone or with the year's offspring, moving steadily but cautiously through a wooded country, always depended upon the eye or ear to detect any danger in front, and, coming down the wind along nearly straight runways, were able to scent any foe approaching from the rear.

DEER EASY PREY AT RAILROAD

My first information concerning this migration came early in my hunting days. One of my hunting companions spoke of the annual visits made each fall by his father and several friends to certain localities between Negaunee and Escanaba, on the Northwestern Railroad, which traverses northern Michigan in an east to west course, some 30 miles south of Marquette. There, on the approach of fall with the coming of the first cold north winds, the deer crossed the tracks in large numbers.

In 1874 I joined this party, which started when the wind turned to the north, about the last of August. In those days the hunting season opened on or before that time. The camp was located behind a sand dune at a station called Helena. At that point

the railroad passes through cuts made in a number of low hemlock ridges extending north and south between open and nearly dry tamarack swamps.

Some of the deer followed large runways in the timber, crossing the track at places where there were deep cuts. Others came at a trot through the swamps, and often were visible at a considerable distance. The hunting was almost equally good for 40 miles, most of these deer passing between Little Lake and Maple Ridge. They came from that part of Lake Superior between Marquette and the Pictured Rocks. A similar migration occurred west of Marquette and down into northern Wisconsin.

On one of my first hunts I was placed on the south side of the track at a deep cut, where the deer had to come down one bank and go up the other. I was advised to wait until the animal was crossing the track, at which time I would have a better shot. I had been concealed in the little brush blind about half an hour when, looking diagonally up the track, I saw a deer come out of the forest and stand on a bank clear of brush. Remembering the instructions, I waited



SHE WAS SURPRISED AT DINNER

As the author came around a turn in Whitefish River one night, a white-tailed doe feeding behind some logs on shore raised her head with a curiously up-stretched neck and looked at the moving jacklight with startled eyes.

with considerable anxiety for it to advance. Just then I heard the rumble of an approaching west-bound train of empty ore cars, and saw that the deer, noticing the sound, evidently hesitated to advance.

After a minute's delay it seemed certain that the animal would turn back, for the train was in sight less than a quarter of a mile away. Taking careful aim, I fired. The deer, giving a tremendous jump, toppled over the bank and lay with its head and shoulders across the nearest rail. Seeing that it would take quick action to reach the animal before the train mutilated it, I dashed forward. The heavy engine passed just as I pulled the deer aside, the engineer excitedly waving his cap by way of congratulation.

On one of the fall camping trips at Helena the wind shifted to the south the afternoon of the second day, and any likelihood of deer crossing the track depended upon the return of the colder winds. Toward evening we were visited by a miner of Irish descent, who carried an ancient and rusty weapon of uncertain caliber. He asked if he might borrow a headlight we had in camp.

For nearly two miles along both sides of the railroad were deep ditches made by the removal of the earth to fill the roadbed through the swamp. Throughout the summer these ditches were filled with many water plants favored by the deer. Both the local deer and those traveling south often came after dark to the ditches to feed, where they could easily be shot by any one walking along the track with a headlight.

Having shot several deer before the wind changed, and not caring for this method of hunting, except as a last resort, we prepared the light and instructed the ambitious night hunter concerning its use. We told him just how the shining eyes of a deer would look when reflecting the rays of the lantern.

Soon after dark the Irishman started down the track. Within half an hour there came a tremendous report, vindicating the aspirant's remark that "the gun was loaded with a handful of powder and another of slugs," and he "rather guessed it would lay out anything that came in the way." After waiting several hours, we went to bed wondering just what had happened.

At daybreak the fly of the tent was jerked open, disclosing the irate face and bulky form of the section boss, who lived half a mile down the track.

He grimly asked, "Were you boys out under the light last night?"

A spontaneous and unanimous response in the negative seemed to reassure him. He remarked that it was a fortunate thing, since the time had come when a graveyard should be started for fool hunters in that neighborhood.

A PET SLAIN IN THE SECTION HOUSE

Pressed for an explanation, he said that after his men had gone to bed, there came an explosion, sounding as if "Mogul No. 9 had busted her boilers." Investigation showed that the entire lower sash of a window of the section house had been blown to pieces, and in the middle of the floor lay the mutilated body of Black Tom, their cat. The slugs, after passing through the cat, had continued into the logs between the occupied upper and lower bunks.

On opening the door and looking out, the men thus rudely awakened saw a headlight and some fellow hastily reloading his gun. Thereupon each had seized an ax or a crowbar and started toward the surprised hunter, using language common to those parts. But hampered by bare feet, they were unable to overtake him. When last seen he had been headed in our direction.

What had become of the hunter and our light was now the question. Toward noon a stranger appeared and, depositing the lantern by the tent, prepared to depart with only a bare greeting. We asked him what had become of the man who borrowed the light.

He replied that Pat had crawled into his tent some time in the night with a tale about "being chased up the track by a band of wild Indians brandishing tomahawks and spears," and if he "had not been a sprinter they would have got his scalp."

Pat had said he intended to take the first set train in the morning for the mines. Before leaving, he told how he had fired at a big pair of green eyes, and how a crash and a chorus of war-whoops had ensued. That was all the deer hunting he needed for the remainder of his days.

As the number of hunters increased along the railroad each fall, scaffolds were built a little way to the north on some of the approaching runways, thus cutting off the

hunters lying in wait at the track and leading to many controversies. On one occasion, when still-hunting along a trail, I found the remains of an Indian deer fence running for half a mile to the southwest, showing that years before the Ojibways had taken advantage of this migration.

It is well known that deer will not jump even a low obstruction placed in the general direction they are traveling. Such a brush fence, if it crossed a number of runways, would turn all the migrating animals toward a point where the Indian hunter could kill them readily. When he was absent, the animals might be precipitated into a pit covered with brush, in some instances to be impaled on sharp stakes at the bottom.

In 1885, about 12 years after my first experience with migrating deer, I made what proved unexpectedly to be a last hunt for them. On arriving at one of the favorite crossing places, I found that a barbed-wire fence was strung for miles on the south side of the track and that post holes were ready on the opposite side. It was apparent at once that this double barrier would soon terminate the annual migration and that a winter home must thereafter be found by the deer in the forest back from the inhospitable shores of Lake Superior.

THE AUTHOR FEELS REMORSE

Before putting up the tent, I took a position on a high bank, from which place I saw a deer crossing the track some distance above. I wondered which direction it would take when it came to the fence. Soon the unfortunate animal came ambling along, looking for an opening to the south, and my bullet ended its career. Feeling that such hunting was unfair, I gathered my outfit together and departed on the next train.

Thus ended the deer migration of northern Michigan. Today all the great runways are obliterated by bushes and fallen trees. Contrary to expectation, the deer soon adjusted themselves to their permanent home on and near the south shore of the lake. While sometimes in great peril when the snows are deep or crusted, they have had on the whole a safer place than they would have had in their former winter retreats in the south, where a largely increased population would have taken a greater toll than the timber wolf or the lawless hunter of the North.

There has always been a tendency on the part of some, when describing the whitetail, to illustrate the text with heads bearing an extraordinary number of points; but this animal, like the elk, has a remarkably uniform growth of antlers in size, shape, and number of points. Antlers with 30 to 40 tines, or half that number, are simply freaks and no more typical of the whitetail than would be an animal with three legs.

Several million bucks have been killed in the United States, Canada, and Mexico in the last 75 years, and most of the antlers of unusual size or marked eccentricities in growth have been saved. It would be strange if in this large total there were not hundreds having an abnormal number of points or some other unusual malformation. The number of freak antlers, some of an astonishing appearance, appears to be greater in parts of Texas than elsewhere in the range of the whitetails, and curious local theories have developed to account for them.

The normal yearling buck is called a "spike horn"; the second year the deer is called a pronghorn, the antler usually having two points forming a Y. In the third, fourth, and sometimes the fifth years, additional prongs represent age fairly well.

After the third or fourth year, however, there is no really accurate way of estimating the age except in the most general terms. The size and massiveness of the beam and the number of points are uncertain criteria, especially when a deer has passed



THE YOUNGSTER WAS SHY

Effort to get doe and fawn pictured while apart failed, for the fawn persisted in keeping behind its mother, peeping over her back at the strange glowing light. When the flash was fired, the fawn's eye was peeping just above the doe's back.

its prime, for then there is usually a recession in the size and proportions of the antlers.

The average number of points of adults on each side varies from four to five, according to the range. In the Southeast the whitetails are usually "four-pointers"; in the North and the Southwest the largest bucks average five points.

Sometimes it has been suggested that a pair of antlers having a great cluster of tines or other abnormalities has resulted from an external injury during early growth, but this, too, is generally erroneous, for a peculiarity in one antler is very often duplicated in the other.



ALARM LENT WINGS TO HER HEELS

This doe had been walking along unconcernedly (see opposite page). By the use of the double flashlight, the author caught her in flight after she had touched the string and exploded the first flash.

During the period of growth the antlers are covered with a skin overgrown with short, stiff hairs. At this time the antlers are said to be in the "velvet." When the antlers reach their growth, late in summer, the skin on them dries and falls off in shreds and patches, leaving the new antlers in perfect condition.

LOSS OF THE VELVET

It is a common belief that the animals help to rid themselves of the velvet by rubbing the antlers among bushes and against small trees. This belief, erroneous so far as the white-tailed deer is concerned, is based on the fact that the velvet is shed during the latter part of the summer and later the bucks are seen rubbing their antlers against, or "horning," small tree trunks and bushes.

Many kinds of deer are kept in enclosures in zoological parks and similar places where no suitable trees are available, and yet their antlers develop, lose the velvet, and, dark and polished, appear similar to those of animals in a state of nature.

For more than 20 years I hunted deer in northern Michigan through September and October; yet I have no record or recollec-

tion of a buck in the velvet after the end of September. The great majority had lost their velvet before the twenty-fifth of that month. October 5 is the first date, according to my diary, on which I observed a tree that had been freshly rubbed by the antlers of a buck.

My records show that for three consecutive years I saw the first freshly rubbed tree on October 13. The period for the main antler rubbing in this region is about the middle of October.

Sometime in the early part of October, the exact date depending on the advent of cool, frosty nights, the bucks reach their prime. They are fat and full of energy with the awakening excitement of the approaching mating time.

The first manifestation of this is a growing restlessness, which causes them to move about more than usual by day and to rub their antlers against small tree trunks and to paw the ground vigorously where does have bedded down or have left their scent by other means.

I have given particular attention to the rubbing of antlers, and have never seen a buck bring any part of the antlers into con-



WALKING AT HER USUAL GAIT DOWNSTREAM, THIS DOE TOUCHED THE STRING

The flashlight flared and caught her in a moment of undisturbed calm. Then as she ran away in alarm, the second flash recorded her again (see opposite page).

tact with the tree trunk except a few inches along the convex middle of the outer part of the beams. The part of either beam rubbed against the sapling appears always to be the same, and this would be inadequate either to remove the velvet or to polish and stain the entire antlers.

My observations prove that in northern Michigan, at least, the velvet had completely disappeared weeks before the antler-rubbing period. This was further confirmed by my many examinations of the fragments of bark at the bases of the saplings rubbed, among which there never appeared any sign of the "velvet."

In rubbing the antlers on a sapling, the whitetail lowers the head until the nose comes within a couple of inches of the ground, and then, in a deliberate way, presses one beam up and down against the tree. The friction removes a strip of bark for about 16 inches from the fresh white wood. The tree, small as it is, is seldom girdled. Thus it is evident that the animal stands in one position while rubbing.

Later in October the necks of the bucks become swollen and they begin hunting the does. At this time they lose much of their

usual timidity and travel restlessly from one part of the forest to another, usually moving up wind at a walk or slow trot, with their heads held high, searching for the scent of a possible mate.

The great majority of the does do not accept the bucks until about the last week of October and they begin to evade them by the last week of November. Although the does pass most of their time hidden in cedar swamps or other thick cover, they go to higher ground when fawning time comes, where the young hide in balsam or maple thickets. They occupy such retreats during the summer and are thus in more open haunts than the bucks and more subject to danger from poachers. About 90 per cent of the fawns are born between May 25 and June 25.

ANTLERS USED IN BATTLES WITH RIVALS

Contrary to general belief, the antlers are not for use in defense against predatory animals, such as the wolf, for they are shed before the coming of the deep snows. When brought to bay, a buck will make his final stand by facing the foe, rearing high, and striking down with the sharp forefeet at any



WHITETAILS FIND GOOD FORAGE NEAR MARQUETTE

In this partly cutover forest of mixed conifers—maple, beech, white and yellow birch, and other trees—is a vigorous undergrowth. Among it the deer are always assured of abundant food and shelter, for it is low enough for them easily to reach its leaves.



ABROAD AT NIGHT

White-tailed deer are usually night feeders, especially in a populated region, and wander far and wide for pleasing forage plants. Some leave their daytime coverts late in the afternoon and others may not seek cover until after sunrise. This doe was caught by a canoe flashlight.

enemy approaching him. The antlers are, therefore, purely a sexual manifestation, being used freely in battles with a rival. These battles sometimes develop into serious affrays, and death may ensue when the antlers become inextricably interlocked.

The next stage after the rut in the life history of the whitetails is the shedding of the antlers. In northern Michigan this usually begins about the middle of December, and by the middle of January most of the antlers have been dropped.

Through several causes, such as age and physical condition, some bucks retain their antlers until later dates, rarely until April. After the old antlers are dropped, two to six weeks pass before the growth of the new ones begins.

WHY SHED ANTLERS DISAPPEAR

It is somewhat of a mystery, with many thousand pairs of antlers shed every fall in the forest, why they are so rarely found by hunters or other persons passing over the ground. Probably most of them disappear within a comparatively short time through disintegration and from being gnawed by mice, squirrels, rabbits, and porcupines. In arid regions, or when rodents are nearly or quite absent, dropped antlers remain in good condition for several years.

In consideration of the wide distribution of the whitetail and the extent of its pursuit as a game animal, a surprising uncertainty prevails among sportsmen concerning its breeding habits. The breeding season varies materially with the latitude and with the altitude of the region in which the animals occur. It is known that the period of gestation is about seven months. If either the time of the rut or the time when the fawns are born in any locality is known, it is a simple matter to fix the other.

In contrast to the very regular breeding period of the whitetails in northern Michigan is the irregular habit of deer of the white-tailed type in Panama, which have their young at various times during the year. This is due, no doubt, to the sameness of the climate there, with the growth of green vegetation continuing throughout the year. As might be expected, occasional fawns are born at unreasonable dates in northern Michigan, sometimes by the middle of April and at times as late as October. Such fawns meet severe weather conditions and virtually none of them live.

Once in October I was seated on a log by

a maple thicket near a much-frequented crossing between two cedar swamps, watching for deer. The leaves had all fallen from the deciduous trees and formed a dry carpet several inches deep. Any deer moving about could be heard for a long distance.

Suddenly a loud rustling of leaves announced the approach of an animal on the other side of a slight rise in front of me. The noise was so loud that I thought it must be a large buck, and sat with my rifle ready in tense expectancy.

To my surprise and disappointment, a little spotted fawn appeared instead of the expected large buck. This innocent youngster, not more than 10 days old, came down within a few yards of me. The doe did not appear and a search failed to reveal her. I inferred she had been killed by a hunter.

On St. Vincent Island, off the northern coast of Florida, the white-tailed does are said to drop their young about the middle of July. An observer living on the island informed me that this is the most favorable time for the does, since the rains at this period provide an abundance of new vegetation. In southern Florida the fawns are reported to be born at rather irregular times.

The fecundity of the whitetail is one of the main factors in maintaining it on its present ranges and in successfully introducing it elsewhere. In the doe's first breeding season, when she is about two years old, she usually has a single fawn. Each season for 10 years or more thereafter two fawns are usually born, and sometimes three.

THE WHITETAIL IS PROLIFIC

I know of one instance of a slain doe that contained four well-developed fetuses, but this was an exceptional case. An allowance of one and a half fawns, as an average, for the breeding does is a conservative estimate. The whitetail is attentive to its young, and therefore a large percentage of fawns are reared.

In the Lake Superior region between the last of May and the end of June, when her time arrives, the doe seeks a dense little thicket on well-drained, rolling ground, away from the bucks, which frequent the dense, damp, swampy areas. During the first two or three weeks the fawns lie hidden most of the time except when visited by the mother, and she feeds about in the neighborhood and goes to the nearest watering place by herself. In July the little ones follow her about, especially at night.

By some inherited inhibition the fawns lie quietly hidden in the thickets chosen by the does until their mothers consider them strong enough to follow. It seems strange that wolves and other predatory enemies do not take a greater number of the little creatures in this period of helplessness.

Many old hunters advance the theory that during pregnancy and while nursing the young, the scent glands of the does do not function and that these glands in the fawns are also inactive. This, if true, would certainly be a most helpful provision of nature to save the breeding animals.

At the age of about two months fawns become exceedingly active and agile, sometimes almost outrunning the does. They are easily tamed when young and become much attached to their human guardians, if treated gently. When found very young, they appear to have no fear of man and will very quickly follow their captor.

A scientifically accurate presentation of the exceptional productivity of the white-tailed doe in a given period shows that one female and the successive offspring would total 130 in a ten-year period. All increase would be lost by the killing of the ancestral doe, whereas when a buck is shot the number would be reduced by only one. This is a strong justification of the buck law.

SEASONAL CHANGES OF PELAGE

In its more northerly ranges the white-tail has two very distinctly colored coats each year, the change from one to the other being caused by spring and fall moults. The spring moult eliminates the heavy winter hairs and provides a lighter, shorter-haired coat of bright rusty red, which is carried through the summer. The color, strongly contrasting with the green summer foliage, has given rise in some localities to the name "red deer."

Early in September the summer coat begins to be replaced by the thicker winter pelage, which for a month or so after the loss of the red hairs has a somewhat slaty gray color and has been termed the "blue coat." This soon passes into the thick, long-haired, gray winter pelage.

Fawns wear a reddish coat plentifully marked with white spots from birth until cool autumnal weather comes on, when they change into a gray winter coat similar to that of the older animals.

It would be difficult to present accurately and comprehensively the feeding habits of



SUCH SIGNS PROVE THAT THE MATING SEASON APPROACHES (SEE PAGE 213)

the white-tailed deer throughout its extensive range, for there are few persons who can speak authoritatively on this subject. The variations in forage during spring, summer, fall, and winter are largely influenced by altitude and latitude, and a year-round knowledge of the seasonal changes in the vegetation of each region is required of one who would claim full knowledge.

The abundance of the whitetails about Lake Superior has brought them under my observation more or less continuously during long periods. While the whitetail is usually designated as a "browser," like the moose, it is in reality little restricted in its choice of food plants. In fact, at one season or another it eats almost any green vegetation except spruce and grass.

Summer offers the greatest variety of food, with leaves of maple brush and various deciduous second growths, besides fungi and brambles, such as blackberries and raspberries, together with many other kinds of herbage, acorns, and beechnuts. The watercourses and small lakes are much frequented by the deer in summer, where the developing lily pads and the stems and roots of water plants afford favorite food.

In this northern range the killing frosts and the first snowfalls bring about a radical change in diet. The chilled waters terminate the supply of aquatic plants and the deciduous trees become bare. Until the snow is more than a foot deep, there remain great tracts of ground pine and ground hemlock that the animals can still reach by pawing away the snowy cover.

Finally the time comes when ground feed is no longer available, and then the deer feed on the buds and twigs of maple and birch, although their main dependence then is on balsam, hemlock, and cedar. Large hemlocks have no branches low enough to be reached by deer, but small second-growth trees afford a much-used forage. Midwinter is the dangerous period of scarcity, and unless the swamps are well supplied with cedar or balsam, the buds and twigs mentioned previously are insufficient to maintain deer in large numbers.

The indifference of hungry deer to grass has always been a surprise to me. In Presque Isle Park, just north of Marquette, where wild deer in large numbers go and come unmolested, every vestige of natural food has been destroyed, and yet the driveways about the park are fringed on either side by tall grass.

Grand Island, 40 miles east of Marquette, became so overstocked with deer that because of insufficiency of food many starved and others had to be shipped to eastern deer parks. There, too, more than 20 miles of driveways were lined with grass.

DEER SELDOM EAT HAY

Even hay is seldom eaten by the whitetail. For many years it was our custom to stack hay on wet meadows not far from Whitefish Lake Camp. Later, when the snow was sufficiently deep, this hay was hauled in on a jumper sled for the use of the livestock. In many years the deer fed only once on these distant haycocks.

One winter, when the caretaker went out to haul in the hay from a certain meadow, he found not a bit of it left, and the well-trampled snow showed that the deer were responsible for its disappearance. He had been advised by a farmer that if he would sprinkle salt liberally over the haystack, this coarse marsh grass would be better appreciated by the livestock.

The deer evidently concurred in this opinion. In some parts of the country hay has been used in winter for starving deer.

Whitetails always show a fondness for clovers of various kinds and for alfalfa.

The eyesight of the whitetail is rather poor and indiscriminating. If the hunter remains quietly seated or stands motionless, and if he is not clothed in the bright colors sometimes used at present to escape mistaken shots, a deer may pass very near and in full view without noticing him. On the other hand, the deer quickly detect any movement. For these reasons the hunter who remains quietly in favorable places may get a much better shot than if he is constantly moving. When a whitetail catches a glimpse of a moving hunter, it acts with almost electric speed and in a single jump may be in safe cover.

SHOOTING BEST AT DAWN AND DUSK

In northern Michigan the bucks come out of the swamps at dawn and remain on their feeding grounds for several hours before they go to shelter. An hour or two before sunset they again come out. The hour after dawn and an hour before dark are likely to yield better results to the hunter than all the rest of the day.

In some cases, however, instead of seeking dense cover during the middle of the day, the bucks may bed down near the top of a slope, close to or between logs, from which place they can command a view over a considerable area and thus detect approaching danger in ample time to depart quietly. This, I found, was a common habit among whitetails in the mountains of Pennsylvania and West Virginia, where swamps are infrequent.

In those mountains the experienced hunters followed the higher slopes and low ridges looking for deer on little flats or benches below. Toward nightfall the animals descend to bottoms along streams, where they find water and a more varied vegetation.

The comparatively poor vision of the whitetail is offset to a large degree by its acute hearing. For this reason the snapping of a twig, the rustling of dry leaves, or the crunch of the crust on snow are all heard by the deer and often render them unapproachable. Loitering on a good stand, or on a platform in a treetop, may give success, although it requires little of the hunter's skill. Deer rarely look up and so seldom see the hunter on a platform.

The hopeful hunter must take into consideration the keen sense of smell of the whitetail. Just how far a deer can smell

a hunter in the woods is not known. Varying conditions of the atmosphere as well as the wind have their influence. When in long narrow bays or channels, I have seen deer detect the approach of a canoe by scent when it was more than half a mile away.

It is a truism that still-hunting should be done up the wind. Conditions vary so much, however, that it is difficult to lay down rules. Early or late in the day the wind is commonly less or a calm prevails. One can hunt down the wind, watching for deer on one side and the other.

I have often been unable to account for deer and moose failing to get the scent from our canoe as we approached them closely or even circled them. When hunting them with a flashlight, we sometimes remained near for so long it seemed inexplicable that we were not smelled. The frequent calm that prevails on the water at night may be a reason.

The water of lakes and sloughs is often warmer in summer than the night air, and this may create a vertical current that would carry the scent upward. As already noted, the habit of the deer and moose of thrusting their heads below the surface to feed on aquatic plants and their intense interest in drinking at licks may temporarily deaden their smell.

SOUNDS UTTERED BY THE WHITETAIL

Whitetail fawns sometimes utter a low, whimpering sound scarcely audible 10 yards away. If seized, a fawn utters a series of loud, shrill bleats expressive of mortal terror and audible for a quarter of a mile. Sometimes a deer one or two years old will bleat when badly wounded, but fully adult animals seem to be voiceless except for the sounds described below.

Bucks have a loud, short, and rather hoarse snort, or "whoosh," which may express curiosity or alarm. This sound, which is made with force, may be uttered only once when the animal is startled or suspicious, or it may be repeated at short intervals for half an hour while the deer remains at the same place, or even while it is running.

After a buck was startled by a flashlight or by some other cause at the water's edge of the slough at Whitefish Lake, it often retreated to the top of an adjoining hill where it would continue to snort and paw the ground with its front feet, so that all the deer in the neighborhood were put on the alert. This was sometimes annoying,

for it prevented other deer from coming down to the water to be photographed.

A buck that had once been alarmed by a flashlight at the slough always snorted and dashed away at the approach of the canoe, thus alarming all the others near. Consequently, I introduced the practice of hanging a lantern in a sapling where any deer coming in could see it. When those that had been flashlighted saw this as they came down, they at once retreated so that when the canoe entered the slough we were assured we would find only animals that had not been photographed.

The snort of the doe is a longer-drawn, more hissing whistle than the snort of the buck. Thus the sounds of the two are usually easily recognizable. These sounds uttered by both sexes are often termed "blowing" or "whistling." Fawns sometimes utter a curious hissing sound, which becomes louder as they grow older. Whenever a hunter hears a snort from the deer he has fired at, he may score a miss.

THE WHITETAIL A SOLITARY ANIMAL

The whitetail seldom associates with others of its kind; in fact, deer of this type from southern Canada to Peru are solitary animals. We find the blacktail, mule deer, elk, and caribou more or less closely associating during parts or all of the year. The gregarious habit is less marked with the blacktail and the mule deer; but the elk often congregate in large herds, and some of the caribou herds are known to contain enormous aggregations of animals. The greatest herds of elk and caribou are seen during migrations and in winter.

When hundreds of whitetails visited the many salt licks at the south end of Whitefish Lake and those of a similar character elsewhere, they always came along the runways alone, except, of course, in the case of does and fawns. At such places I have seen 25 or 30 deer gathered at one time. They might all leave together when frightened but would return again singly.

Another proof of their solitary habit was seen when the whitetail migrated by thousands every fall south of Lake Superior in order to avoid the deep snows. They almost always traveled singly, except in the case of the does and fawns. Once in a while two yearlings would be seen, probably twin fawns of the year before.

The whitetail has a variety of gaits that in some respects are peculiar to it. Both

bucks and does when alarmed have two methods of responsive flight. The first is a swift, rather short, stepping, running, or trotting gait that covers ground with surprising rapidity. At such times the tail is usually held down.

The second is of a series of bounding leaps with head up and tail stiffly erect. This bounding movement is common to both sexes, but appears to be more general with the bucks, especially in the rutting season.

Once when still-hunting I passed silently around the base of a large hemlock and nearly collided, head on, with a big buck. Instead of bounding away, the frightened animal pivoted on his hind feet and dashed away at almost incredible speed for several hundred yards with a swift running gait, head outstretched and tail held down. Sportsmen have commonly had an exaggerated idea of the speed of running deer, but the automobile has definitely reduced estimates of the rate.

Under ordinary circumstances, when not alarmed, the deer move from place to place at a graceful walk. When they desire to move quickly through open country or thin forests, or when flies torment them in summer, their gait changes into a long, swinging trot that covers the ground rapidly. At such times the head is always outstretched and the tail down.

THE GAIT OF THE WOOLING BUCK

A buck, when trailing a doe, goes at a short stepping, quick trot with the nose held low in order to follow the scent left in the tracks. On sighting the doe, he raises his head and increases his speed.

Whitetails, especially the bucks, are extraordinarily agile, and every one familiar with them in the wild has been amazed by their great leaps, made with almost the lightness of a bird on the wing. I once saw a buck leap down a hill slope, clearing at least 40 feet at each bound. At other times I have seen them clear windfalls 10 feet high.

In a deer park at Marquette, where half a dozen deer were confined by a closely built 12-foot wooden fence, a buck was found lying outside one morning with both front legs broken. An investigation showed that a small dog had burrowed under the fence in the night, and in its terror the buck had evidently leaped high enough to scramble over the barrier and fall beyond.

The whitetail is probably the most alert and resourceful of its kind. It avoids the hunter, and probably other enemies, by skulking from sight and successfully screening itself from observation, often behind what later appears to be wholly inadequate cover. From such vantage points it watches its foe and often, if unobserved, will permit him to pass within a few yards.

ACTIONS OF WOUNDED DEER

Although the subject is not a pleasant one, some observations concerning the actions of wounded deer should be recorded. On a hunt at the slough I wounded two deer from the same stand at perhaps 150 yards. At this distance I usually aimed well back of the shoulder to insure a hit.

The first deer came down to the water and stood broadside to me. At the shot it leaped straight up in the air, with all four feet gathered under it and, as it came down, it disappeared, running up the trail down which it had come.

Its actions convinced me that it had been hit in the body, and as customary in such cases I waited about 15 minutes so that the animal might lie down within a comparatively short distance.

Before I took up its trail, another deer suddenly appeared in the same place and a similar shot brought the same reaction. The second deer also disappeared up the same runway. After still further delay I followed the blood-marked trail for about 150 yards. There, about 10 feet from one side of the trail, lay one of the deer, dead, shot through the middle of the body. Marks of blood continued farther along the trail, and I found the other deer dying a short distance away. Had I followed either of these deer immediately after it was shot, it would have tried to evade its enemy, whose identity and location were previously unknown, and, as experience has shown, might have gone on for a mile or more.

One of the primary necessities for a good deer hunter is that he know the relative sizes and shapes of the tracks made by deer of different sexes and ages. The shape of the animals' hoofs, of course, determines the shape of the tracks. The tracks of the adult bucks are distinctly larger, more rounded at the tip, and broader than those of the does.

CHAPTER X

Further Adventures With Michigan Deer

SOME imaginative writers have elaborated on the theory that wild animals as a class are not prone to worry over their safety and are aroused only by immediately threatening danger, so that, having escaped, they again lapse into undisturbed contentment. One cites an instance of a lordly buck running before a pack of timber wolves, and treating the chase as a game of hide and seek, serenely confident of his ability to escape, playfully stopping and then bounding away in evident enjoyment of the comedy.

It is a more or less prevalent belief that a deer or a fox trailed by hounds will often stop, double on its tracks, and run again with delight in the hunt and the outwitting of its enemies. All this idea of pleasure on the part of the victim of such pursuit rests in the minds of the human observers. Age-long experience has taught these animals the full purpose of such pursuit, they know that any failure in their own cunning, fleetness, and endurance means certain death.

WHITETAILS' FEAR OF TIMBER WOLVES

The greatest natural enemy of the deer in the Lake Superior region is the timber wolf, which is there abundant. This large, powerful, and cunning animal long ago became skillful in this district in killing its prey. As the result of experience extending far back in the past, all antlered animals live in constant dread of this merciless enemy.

In the wolf country, during the open months, the deer usually feed or rest near a lake or watercourse. If near a stream, they can reach it by a preliminary burst of speed, and by crossing it several times may baffle the pursuer.

In winter such chances of escape are not available; but if the snow is not too deep, the deer can get a better footing than the wolf. By hiding in thick swamps behind windfalls, they can often detect the approach of an enemy and may escape by leaping over masses of brush and other barriers. Every deer in the entire region realizes through experience and inheritance that its trail invites the coming at any time of a skulking, noiseless beast, and that it must be on guard.

Man with the rifle is a comparatively recent enemy, and on his appearance fawns may sometimes gaze with widely opened, innocent eyes. The sight or howl of the timber wolf causes instant alarm. The deer in northern Michigan have learned that they need have little fear of the gun during most of the year, when the area is closed to hunting, but they know too well that there is no closed season for the wolves.

In times of stress the whitetails sometimes show their mental alertness by seeking the protection offered by the vicinity of man to escape their four-footed enemies. While the deer have an overwhelming fear of the wolves, these predatory beasts have acquired a similar dread of man.

I have observed that the timber wolf usually chases the larger bucks, not from any sense of chivalry toward the does, but for the practical reason that a large buck, though it can outrun a wolf for a short distance, soon becomes exhausted and can be overtaken in much less time than the smaller and more agile animals.

Unless a large buck can reach a stream or lake, or can take refuge in the dense, tangled growths of a swamp, over which it can leap more easily than the wolf, it soon falls a victim. The alleged withholding of scent by does during pregnancy and by small fawns, the hoof glands being inactive, would be, if true, another reason why bucks are pursued by wolves more often than are does or fawns.

A DEER DEAD FROM EXHAUSTION

One fall, when I was looking for a buck I had shot at, I saw lying on a runway ahead the body of one that I supposed to be the deer sought. Examination disclosed no bullet wound or other injury. The swollen and protruding tongue indicated that the deer had been pursued by wolves, from which it had escaped by swimming the lake. On attaining safety, it had died of terror and exhaustion.

On removing the hide, I found that the flesh next to the ground was dark red, through the strong congestion of the blood. When hunting with dogs was permitted in some States, it often happened that the



OUT LATE AT NIGHT, A SPIKE BUCK FINDS A FEAST

This yearling in its gray winter coat has come to sample some cabbage-leaf bait placed after the first snowfall in a spot suitable for photography.

flesh of a deer killed after a long chase was unfit for food.

Years ago there was probably no better place in which to study the relations between deer and wolves than the south end of Whitefish Lake. Here the many converging runways to natural salt licks led to a concentration of the deer. The fact was well known to the wolves, and whenever the deer became scarce there I knew that wolves were about, and probably lying in wait.

Although these animals usually hunt by night we saw them a number of times during the day. One wolf came down the bank and, on reaching the tall grass bordering the slough, it jumped up again and again to look ahead, just as intelligent hunting dogs often do.

The wolf then went up the opposite bank, beneath which our canoe was concealed, and stealthily approached a salt lick about 30 yards away. Finding no deer there, it returned the way it had come and, after looking out over the water, it disappeared into the forest. Unfortunately my gun was not at hand.

Several days later, when a wolf appeared on the opposite bank of the slough, I fired

a charge of buckshot at it. Examining the spot on which it had stood, we found a tuft of hair, a few drops of blood, and two flattened shot that had passed through the animal's body. Several days later a wounded wolf was seen staggering along a lumber road a few miles to the south, and was dispatched with a club. Its body had been pierced by two pellets.

WHITETAILS WARY OF WOLVES

When wolves were about the slough, it was interesting to watch the actions of the more venturesome deer. I remember one large doe that came to a salt spring and repeatedly, after a single swallow of water, went up to the wooded flat behind, evidently looking for a wolf, and then returned. It passed half an hour in this timid fashion while satisfying its strong desire for the salty water.

Deer always came watchfully down the trails to the licks, stopping often to look back and all about. When retreating temporarily from the lick after taking a drink, they commonly went up a different trail from the one down which they had come. After being gone a short time, they would

reappear, descending the original trail. Sometimes more than 20 of these fugitive visits to a lick would be made by a deer before its thirst was satisfied.

The vicinity of the slough was one of the few places in which I have seen wolves chase deer in daytime. Whenever a deer boldly plunged into the lake, I knew it was being pursued by a wolf; for ordinarily deer entered the water cautiously, looking about as they did so. Years ago it was not unusual in spring and fall to find dead deer floating in Whitefish Lake, into which they had been driven by wolves. Afraid to go ashore, they had perished from exposure in the cold water.

LESS FEAR OF MAN THAN OF WOLVES

Late one July afternoon, while out in a canoe on Whitefish Lake at a time when the water was warm, we found five bucks lying in the shallows near shore. They were entirely submerged with the exception of their heads, which were concealed from shore by half sunken logs or brush. A few minutes after we had paddled out on the lake, we found the first one, a large buck, lying in the water behind a fallen pine log and we approached within 10 feet of it, but it did not move.

A hundred yards farther along was one of the largest bucks I have ever seen, concealed from the shore by low brush. As we returned along the opposite side, we saw three other bucks lying similarly concealed. It was plain that wolves had encircled the lake, and that the deer, being familiar with the team work of their enemies, had concealed themselves in the water.

Only one of the five animals ran ashore as we approached. They had more confidence in men than in wolves, for they often saw in the woods during the long closed season unarmed men who did them no harm.

One afternoon when we were in the canoe, sheltered by a blind built in shallow water, we heard a splash at the other end of the slough. The field glass revealed a large buck swimming toward us. When it had gone a few yards, two smaller animals followed it into the water.

These proved to be wolves, which swam a little behind and on either side of the buck without trying to attack it. Apparently this was a chance for a remarkable picture, and I made ready the camera. Before they were near enough to photograph, the deer entered the alders on one bank with

one wolf at its heels, but the other wolf, to our surprise, landed on the opposite shore.

Feeling sure that the buck would take to the open water of the lake, we paddled rapidly in that direction. Soon it was seen swimming across, while down the steep bank behind it came the wolf, which without hesitation, jumped into the water and swam in pursuit—a rare occurrence, since wolves usually abandon the chase when the deer enters broad, open water.

I asked John whether we had anything in the boat with which we could kill the wolf, and he answered excitedly, "Only my jackknife."

The keen-eared wolf evidently heard us; for, looking toward the canoe, it at once turned back. Then began a hard chase. As the wolf emerged from the water, I endeavored to hit it with the blade of a heavy hardwood paddle, but it escaped the blow.

Looking toward the other shore, where the buck was about to land, we saw the second wolf sneaking down the bank to meet it. Thereupon we shouted and struck the side of the canoe with the paddle, making such a racket that the wolf gave up the chase and retreated.

This happening affords an excellent example of the intelligent cooperation of wolves in the chase. Without our interference the buck was doomed.

Although often hunting in parties of two or more, wolves also hunt singly and make kills. On a river bank we once found the remains of a large buck killed by a single wolf, which had feasted and gone.

Whitetails like to be near water because they need a drink once a day, because they find better feed growing on low ground, and because the water helps them escape wolves. Broad areas of forest without water are noticeably barren of game, be it deer or grouse.

ANOTHER DEATH FROM OVEREXERTION

About the summer of 1880, with a hunting companion and our colored guide, Samson Noll, I visited a beautiful body of water known as Sixteen-Mile Lake in northern Michigan, now in Alger County. Most of the water of this lake flows into Lake Michigan, but some of it is drained down a narrow and abrupt slope to Lake Superior. The region was very wild, for the railroad along the lake shore had not been built.

After setting the camp in order, we entered the canoe, with Noll paddling in the stern. Within a few minutes we sighted a



WHITE-TAILED DEER ARE UNSOCIAL IN HABITS

As the jacklight revealed these two on shore, the one in the rear ran toward the one in front, rising and striking at it with its front feet. The cowed victim, tail held tightly down, hurriedly started away a moment before the flash was fired.

buck feeding in the shallow water at the margin of a long wooded point. Approaching to its base without alarming the deer, we left Noll in the canoe and began a stalk toward a point at which we supposed the deer had entered the woods.

Suddenly the guide shouted, "The deer has gone into the water on the other side."

We hurried across the point, and saw our quarry within easy rifle shot, swimming across a small bay filled with liquid mud.

SCARED TO DEATH BY A FUSILLADE OF MISSES

Action with our repeating rifles began at once. Bullets splashed water about the swimming animal, but so hasty were the shots that none appeared effective.

When I heard my companion's rifle give a click that indicated an empty chamber, I remarked, as he hastily looked for more shells, "Just watch me knock him. I am going to take more careful aim." My rifle cracked, and the deer's head sank.

"This," I remarked triumphantly, "shows the difference when accurate aim is taken."

At the end of the fusillade Noll took us into the canoe and we went for the deer. On the way to the shore I examined its head, the only part that had been exposed to our shots. There was no mark other than two bullet holes through the ears.

On shore we washed the mud from the carcass, and searched carefully without finding another mark.

We were in a state of wonderment until Noll opened the animal's body and said, "I know what killed this deer; it died of fright."

He showed us the stomach filled with blood, indicating that in its struggles through the mud the deer had ruptured a blood vessel. Noll added to our chagrin by suggesting thereafter we use blank cartridges. "The more powder in them the better."

One winter near Whitefish Lake I saw it again demonstrated that whitetails not infrequently die from overexertion and fright. Taking advantage of deep snow, several men made trips on snowshoes to capture deer for placing in a small park.

In each instance, as the pursuers drew near, the bucks, which had shed their antlers, turned and tried to defend themselves by rearing up on their hind legs and striking swift, downward blows with their sharp-

hoofed fore feet. Such a blow reaching its object, backed by the weight of the animal, would be very dangerous.

The deer were captured and their feet tied together. They were then hauled in on toboggans, but a number of them died on the way, although every effort was made to handle them as carefully as possible.

On one of these trips two fawns of the previous season were captured. Although well grown and out of the spotted coat, these young animals showed comparatively little fear of man. After being kept in a cabin overnight and fed some cooked potatoes, one of them escaped in the morning. It was assumed that it could not be retaken. The fawn did not return to the forest, however, but stopped a short distance away, and when offered more potatoes permitted itself to be retaken without difficulty.

The following year at Sixteen-Mile Lake we approached the locality where the deer had died of overexertion. Suddenly I saw a deer on the wooded point. On this trip we had made a rule that the first to see a deer was to have the first shot at it and thus insure more accuracy than formerly.

The deer saw the canoe and entered the woods. At the base of the point was an open space about 20 feet wide, commanding a view of the water on both sides and also at the point. There some hunter had built a high scaffold from which to shoot.

Having the first shot, I mounted the platform while my companions went to drive the deer toward me. After waiting until I thought that the game had taken to the water unnoticed, I began to descend.

Just then I heard a shout, "Here he comes, get ready."

Rather than lose time trying to climb up again, I chanced to leap to the ground, and landed on my back.

AN ACCIDENTAL HIT

As I sat up, the buck passed on the run scarcely a gun's length away. Without putting the weapon to my shoulder, I shot hastily and saw the water splash as the bullet ricocheted across the bay.

In order to show the others that I had had no chance to make a kill, I retained my recumbent position until they arrived.

After hearing my story, Noll said, "Perhaps you hit him."

He examined the tracks the deer had made crossing the sand spit and a moment



HIGH LIGHTS SHOW BRILLIANTLY AT NIGHT

This picture illustrates how the flashlight brings out, sometimes with almost startling distinctness, the white of the underparts, which in daylight photographs are usually shadowed because the body cuts off so much of the light from above.

later reported, "The bushes on both sides of the track are dripping with blood. You must have shot him through the heart."

Soon he found the deer lying concealed by the bushes less than 50 feet away. Greatly elated, I remarked that it had been a good shot.

THE GUIDE WAS WITTY

To this Noll replied, "Yes, it was a mighty fine shot, and I advise you to be sure to fall out of a tree whenever you want to shoot a deer like that."

The old guide enjoyed curbing the boastfulness of his young charges.

After the extension of the railroad from

Marquette east through the peninsula of northern Michigan, in 1881, the killing of deer in that region reached its maximum. Market hunters made blazed trails around swamps and along ridges. They used headlight and shotgun at night and rifle by day. Thus hunting in the most favored resorts of the deer went on day and night throughout a long open season.

MARKET HUNTERS KILLED 150 TO THE MAN EACH SEASON

In addition, other hunters in boats patrolled the borders of small lakes and streams, where they killed great numbers of deer, mainly does and fawns. The most successful market hunters seldom killed less than 150 deer to the man each season.

One hunter located his camp a few miles south of Whitefish Lake, and every morning his assistant passed our camp, his horse loaded with sad-

dles of venison to be shipped by express to Detroit or Chicago. The remainder of the carcasses was left to rot.

This slaughter in the neighborhood continued for five seasons, then a ban was placed on the sale of venison and the killing fell off for a time.

In 1895 the number of deer that could legally be killed each year in Michigan was restricted to five for each hunter, and the license bore five detachable coupons for use in tagging the carcasses. All sportsmen expected this new system to be of the greatest future value as a conservation measure, but there occurred an extraordinary psychological development that upset all calculations.

Marquette County well illustrated what happened throughout the Upper Peninsula.

Prior to 1895 about 300 persons had hunted deer annually in the county. When the first licenses were issued, the usual number that had hunted before applied for permits, but it was noticed that the applications kept on increasing throughout the season until they totaled 652, far exceeding any previous year. The public apparently had gained the idea that the State had awarded each of its citizens five deer a year at a nominal cost for those thrifty enough to act.

PSYCHOLOGY OF THE LICENSEE

The following season other influences, directly traceable to the license system, increased not only the number of hunters, but to a disproportionate extent the number of deer killed. It was observed that persons who theretofore had been content with a single deer, and those that, disappointed on a hunt, gave up trying for a deer, now tried persistently to kill their legal limit, going to the woods again and again in this endeavor. Some were not averse, if personally unsuccessful, to having others supply the missing number.

This situation was further aggravated by the newspapers containing many personal items to the effect that "John Doe has filled his license during the first week," or that "Richard Roe expects to fill his on the next hunt," and other suggestive statements that made each licensee feel that he was on trial as a sportsman and would be the object of ridicule if he returned empty handed. Moreover, the licenses, with their strips of coupons, were conspicuously displayed in factories, shops, offices, and on the street corners, until hundreds of persons who never before had had the slightest idea of hunting deer joined the crowds on their way to the county clerk's office.

Marquette County Deer Licenses	
Year	Licenses Issued
1894.....	300 (estimated)
1895.....	640
1896.....	813
1897.....	853
1898.....	950
1899.....	1,047
1900.....	1,306
1901.....	1,532
1902.....	1,749
1903.....	1,942
1904.....	2,060
1905.....	3,379

An examination of the above figures should prove of interest, especially in view of the fact that there was no increase of population in this county, but actually a small decline, during the period indicated.

This extraordinary increase from about 300 hunters in the county before licenses were issued to more than 3,300 hunters seems to have no other explanation than those given. The system brought about the destruction in the State of hundreds of thousands of deer that would otherwise have escaped, and established a more widely extended habit of hunting among the people than had ever before existed.

The license system in vogue throughout most of the country, however, has been of great value, supplying many States with ample funds for preserving game and in many respects proving of inestimable service. It happened to have the opposite effect for a time with Michigan's main big-game animal. Later, when the one-buck law was enacted and the coupon system discarded, the annual increase of hunters again became normal.

CAREFUL ADMINISTRATION NECESSARY

With the changes in the game laws of the State, including non-sale of game, reduction of the number of deer to one for each hunter, and a shorter open season, many who had gone out under the coupon system ceased to hunt. The number of hunters in the field each season, however, increases steadily with the increasing population and improvements in means of transportation to the hunting grounds. In this connection the following record of the total resident and nonresident deer-hunting licenses for the State within recent years is significant:

1920.....	37,147
1921.....	27,434
1922.....	27,238
1923.....	30,909
1924.....	35,341
1925.....	42,132
1926.....	?
1927.....	?
1928.....	59,073
1929.....	?
1930.....	65,000

These records plainly indicate the need of careful game administration if deer hunting is to continue in Michigan.

The results of the buck law in sections in which it has been in operation have given rise to the opinion that one adult buck for every three breeding does is sufficient to

maintain the herd. In some areas sportsmen were led to believe erroneously that the bucks had been reduced below this margin of safety. The misconception has arisen from the fact that the bucks are ordinarily more retiring than the does and fawns, and seek the shelter of thickets.

It should be kept in mind that an average of 50 per cent of all deer born each year are bucks. Whenever doubt arises as to the sufficiency of the number of bucks in any region, a careful investigation should be made to ascertain the facts before action of any kind is undertaken.

ACCIDENTS AMONG DEER HUNTERS

Through the decrease of hunting areas for big game and the shortening of hunting seasons, the constantly increasing number of hunters tends to overcrowd the more accessible hunting grounds, and the list of persons shot accidentally each year grows larger. Many casualties are caused by careless handling of guns and are difficult to prevent, but most of them result from the victims being mistaken for a deer.

To lessen the number of persons shot, mainly by inexperienced and reckless hunters who shoot at any moving object in the woods or thickets, a number of States have passed laws charging the careless shooter with manslaughter, this action being taken for its deterrent effect rather than as a punishment.

Michigan passed such a law, but the juries almost invariably acquitted the accused hunter under the belief that he had already been punished sufficiently by remorse at having accidentally shot another hunter. The impossibility of obtaining a conviction caused the repeal of the law.

With the buck law now in force nearly everywhere, the writer believes that the shooting of a person through mistaking him for a deer should be made a felony. With the law requiring that the hunter shoot only deer with antlers of a certain size, even if the moving object resembles a deer, the necessity for the hunter to see the antlers in order to determine before shooting whether the deer is of legal size and sex should generally remove any sympathy on the part of juries.

I agree fully with the warnings issued in the press at the opening of each deer hunting season, for most of the accidents are due to inexperience and gross carelessness. At the same time, warning should be voiced

against the practice of condemning unheard all hunters who may have been unfortunate enough to have such accidents.

With more than 50,000 people hunting deer in the forests of a single State, occasional accidents occur under circumstances that should either exonerate the hunter or greatly lessen his responsibility. Some of my own experiences in the northern forest afford evidence that, however careful one may be, an odd combination of circumstances may bring about the setting of a tragedy.

In the early fall of 1883 I passed a part of two days with a companion hunting deer at a place known as Whitefish Meadow. Located less than a mile south of the railroad bridge, this wet meadow is traversed by Whitefish River, which is not navigable for canoes from the bridge. It was necessary, therefore, for us to carry in a light canoe for an afternoon and night hunt.

My companion, Prescott Ely, had hunted with me for 10 years hereabout. At the meadow we launched the canoe and arranged that I should stay at the lower end of the meadow while Ely would paddle a mile farther south and remain until dusk, unless he killed a deer sooner.

I seated myself at the base of a tall pine on a projecting rocky point. An hour or more later a deer came out of the woods and started toward the stream, which flowed about 100 yards from my stand. As the deer approached the water, it was evident that I must shoot before it entered the bushes bordering the river.

A NARROW ESCAPE

When it was about ten feet from the bushes I arose from a sitting posture to brace my back against the tree trunk to steady my aim for the fairly long shot. As I sighted along the rifle barrel I could apparently see the head and neck of the deer as it was entering the bushes. Aiming carefully, I fired and was surprised to see a smokelike puff appear to come from the supposed deer's head.

Since the deer did not run away, I was much puzzled, until the head and shoulders of my friend rose above the bushes. He climbed out and stood looking at the fallen deer.

As I joined him, he said, "You are a great hunter. Why didn't you shoot?"

He explained that, being driven from his post by the mosquitoes, which were anathema to him, he had come down to join me.

On approaching my neighborhood, he had heard a twig crack beyond the bushes, and rising in the canoe in a stooping posture had seen a deer with its head down nibbling vegetation within 10 feet. He fired at its shoulders, and the deer dropped in its tracks.

I realized that in rising for his shot, with his head and neck covered with a gray havelock for protection against the mosquitoes, he had been mistaken for the deer and had drawn my fire. It was evident that we had fired simultaneously, for neither had heard the other's shot.

Shocked at this discovery, I said nothing of my mistake. After dressing the deer, we took it across the stream. When I noticed that my friend's havelock had been cut for about six or eight inches across the top of his head, my trepidation increased.

Near the camping outfit Ely took off the havelock. He noticed the rip but could not account for it.

Upon examining the inside of the garment, I found adhering to it several small tufts of my friend's hair that had been clipped by the bullet.

I quickly removed these, determining in my humiliation to conceal the occurrence indefinitely. Ely attributed my gloominess to my failure to get the deer and tried to comfort me with the assurance that I would certainly get one with the jacklight that night. Later, pleading a severe headache, I refused to go out for the night hunt.

Several years passed before I told my friend how near I had come to ending his career and to blighting my own.



DEER SELDOM SCENT THE OCCUPANTS OF A CANOE

Even when within a few rods they rarely detect the presence of such intruders. The author believes this phenomenon is explained by the calm air with an upward current from warm water or by the effect of a gentle current of air from shore.

During a several days' hunt about Whitefish Lake our companion was Peter White, the "grand old man" of northern Michigan. Although one of the founders of Marquette in 1849, and a pioneer in the development of that region, he did not become interested in hunting until late in life.

Usually he was successful in getting a deer, but had been disappointed up to near the end of this hunt. To give him another chance, I suggested that on our way out we follow a part of the old trail that passed close by a small slough to which deer often came to feed on water plants.

As we approached the place, we heard splashing in the water, resembling the noise

of a deer wading about. The elderly hunter was told to go ahead and look carefully through the alders bordering the water. Very soon he raised his gun and tried to find a small clear opening for it through the brush.

Before he had succeeded in getting a good sight, Fred Cadotte, our Indian guide, and the most experienced deer hunter of his race I have ever met, tiptoed up close behind the shooter and suddenly said in a low, tense voice, "Don't shoot! It's a man."

Flustered by this, the hunter drew back his gun and through the opening we saw the indistinct figure of a man, bending over, scooping up water with his hands and washing his face. He wore a yellowish brown canvas coat, about the color of the deer at that season. While he was bending over the water behind the screen of bushes, he bore a striking resemblance to a deer feeding in the water. We silently hastened by without being noticed.

Later we learned that the man we had seen was a young Mr. Robert Dollar, who was engaged in land-looking, or timber-cruising, and was camped near by. Since then he has become an international figure as the organizer of the Dollar Steamship Line, one of the most successful of our merchant fleets. Unless he sees this printed page he will probably never know of his narrow escape at that time. Had the buck law then been in existence, such possibilities of tragedy as the two described above would have been far less likely.

A DANGEROUS COMBINATION

Going in to camp one fall at a time when deer might be seen along the way, I heard a commotion in the bushes to the right of the trail and raised my rifle expectantly, just as the head of a large buck appeared on the other side of a log. Waiting for the animal to step over the log so that I would have a fair shot at its neck or shoulder and avoid the chance of injuring the fine antlers, I was much startled to see the leg of a man swing over.

The figure was that of a giant Finlander, who was packing a big buck on his back, with its head rising over his right shoulder. The animal must have weighed about 200 pounds. In searching for the trail the Finlander had chanced to come through the bushes just as we were passing. It was fortunate that I withheld my fire, for I was convinced it was a living deer and merely

waited for a better shot. In an instance like this the buck law would have justified the shooting.

The near tragedies just cited indicate clearly the need of extreme caution on the hunter's part. Sometimes, when all the circumstances are known, the hunter would justly be relieved from the charge of willful negligence. The great majority of cases, however, in which men are mistaken for deer and shot are due to inexperience or to a selfish willingness to take a chance rather than possibly to miss an opportunity to get a deer.

A HUNTER'S LIGHT SIDETRACKS A TRAIN

Once when hunting along the railroad where the deer cross in the course of their migration, I used an unusually large headlight on a pole extending well above my head, and strapped to my back.

The light proved too powerful to show an animal's eyes within proper shooting distance; and after two or three deer had run away, I started back along the railroad to camp a few rods from the track. At this point the road was without curves for several miles, and I noticed an approaching ore train on its way from Escanaba to Ishpeming.

The roar of the train and the unsuitable character of my light led me to continue steadily down the track instead of looking for deer. When near camp, I heard the locomotive whistle "Down Brakes," and then ahead of me the train took the only siding available for miles.

As I approached the upper switch, I saw a brakeman standing there, and when I turned my jacklight full upon him he exclaimed, "Gee, this is a good one on the engineer, for he took your lantern to be the headlight of a train running without orders."

In the foregoing narratives nothing of a serious character happened, yet the headlight has claimed many an unintended victim. Before its use was prohibited, many cattle were killed every year in the big-game country under the belief of the night hunter that he was shooting at a deer. Human casualties were, however, comparatively rare.

One night a headlighter fired a load of buckshot through the kitchen wall of a camp, where the only light in the building showed through a knot hole. An examination showed that the buckshot had penetrated the cabin in a circle about the knot hole and narrowly missed the head of

the cook. The deer hunter had mistaken the round glimmer through the hole for the eye of a deer.

On one occasion, not far from our camp, two companions hunted in opposite directions on an old trail, where jacklighting was usually successful. They planned to meet later in the night.

As one of them was returning, he saw a slight glimmer of light ahead and fired at the supposed deer. A few seconds later he was horrified to find that he had shot his friend through the neck. The hunter had been standing motionless looking at one side for a deer and the light at the side of the lantern showed as the other hunter approached. The wound was serious, but the victim recovered.

So deadly did jacklighting become, especially as practiced by market hunters, that for many years laws have prohibited everywhere the killing of deer or other large game by the use of an artificial light. This form of hunting is no longer practiced except by poachers here and there in remote places.

BUCKSKIN CLOTHING HAS BECOME A THING OF THE PAST

During pioneer days in this country and Canada buckskin clothing and moccasins were in general use among the Indians and almost equally so among white hunters, trappers, and other woodsmen. The use of these garments lingered among Indians, especially in the North, until the scarcity of skins made it impracticable to get them for the purpose.

Such habiliments were often fringed and



A DISTURBANCE RAISED MILD CURIOSITY

Just before the flashlight was fired from the canoe a black duck flew up with flapping wings between the photographer and the deer. The expression of the deer shows that it recognized a harmless sound, and is very different from the attitude it would have taken if the disturbance had been of an unusual character.

otherwise gaily decorated, the Indian women rivaling one another in the skill of their handiwork. Some tribes were notable for the beauty of these products.

Except in an extremely limited way, buckskin garments have gone forever, not so much perhaps because woven fabrics have become so easily obtainable as on account of the decreasing supply of deer available and the general laws that forbid, nearly everywhere, the killing of does and fawns throughout the year and of bucks during the summer season when the skins are in proper condition for such purpose.

Buckskin is prime for use in wearing apparel during the summer months when the

animal is wearing a short light coat of hair and the skin is thin. In winter the skin becomes thicker and more spongy to support the bases of the strong, heavy winter hairs. The skins of does and fawns in summer are beautifully light and pliable; this is true of both the ordinary deer of the middle latitudes and the caribou of the North. Skins taken in the North are commonly tanned with the hair left on to serve as a protection against the severe winter climate.

SEASONAL HUNTING COSTUMES

When I was a boy in northern Michigan, it was easy to obtain skins of summer-killed deer. We had them tanned by some skillful squaw. Because the law now strictly prohibits the killing of deer in summer, garments of deerskin made of the lighter skins taken at other seasons are used only by a few who try to imitate the picturesque hunters of the past.

Tanned deerskin clothing had many drawbacks. The material serves well in dry weather, but it takes water like a sponge, becomes flabby, and stretches. When drying, it shrinks and becomes so hard that it will crack unless it is worked and softened as it dries, a laborious process. In addition, the difficulty of cleaning from it the grease and dirt accumulated through long use made it much less desirable for garments than woven fabrics, although it served as a better protection against cold winds.

When Michigan finally limited the deer hunting season to a couple of weeks in November, the ground on the opening date was usually covered with a good tracking snow. This condition being coincident with the mating season, when bucks moved freely, chances of a successful hunt were excellent.

Natural consequences of the short season were a concentration of thousands of hunters in limited areas and an increase of the number "shot for a deer." In order to give warning to the reckless or inexperienced, many hunters wore bright red caps or sweaters, which, while accomplishing the object, also gave due notice to the deer of an approaching enemy.

For the double purpose of having a hunting garb that could in no way be mistaken for a deer and yet so concealingly colored as to deceive the wariest of bucks, I devised a very simple costume. It consisted of an ordinary canvas jacket dyed green and a pair of white canvas overalls, each garment being sufficiently large to go over a suit.

During this late season the deer were usually to be found along the edge of cedar swamps for, except at night, the older ones seldom ventured out into the leafless hardwood forests. Along the borders of such swamps were to be found small detached conifers, and brush, providing browse and shelter for the deer. They were also likely places for a buck to find a doe.

Most deer do not detect a motionless hunter when he is unobtrusively clothed, but are quick to see any of his movements, especially against a white background in winter. In a costume such as I have described, the main portion of one's body becomes merged in the surrounding evergreens, while the movement of the legs cannot be noticed against the snow in their white covering. Should there be no snow, then green overalls should be substituted. The use of a green cap in either case aids in the disguise.

I have often wondered why hunting garments in green have not been more generally used. This color is a predominant one in nature, is pleasing to the eye, cannot be mistaken for any animate object by the gunner, and is least likely to excite suspicion in any game animal.

A WATERPROOF FABRIC

The only tent that I always found waterproof under all weather conditions is made of so-called balloon silk. Its fabric is of long staple Egyptian cotton which has a natural gloss and softness, giving it the appearance of silk. When treated with a mixture of linseed oil and paraffin, it becomes thoroughly waterproof.

This fabric in green, white or brown can be obtained in long strips, a yard or so wide. At a trifling cost almost any tailor can make it into good hunting garments. Such garments are light in weight, pliant, durable, and wind- and water-proof as well as non-absorbent. They do not become soiled in constant use and are not subject to mildew when stored away. In all respects and under all weather conditions they are superior to leather, rubber, or ordinary canvas.

In a ducking blind a suit made from the brown fabric serves better than any outer garment now in general use; for it is warm, dry, of the right color, and so light as not to encumber the movements of the shooter. To insure success, safety, and comfort, I urge upon those afield the importance of knowledge of apparel needs.

CHAPTER XI

Grand Island as an Experimental Game Preserve

PHYSICAL barriers such as set islands apart not only help to preserve the purity of a given species but are often the means of furthering the origin and development of new forms. All organic life has its variations; and some forms may develop an abrupt variation, or "sport," into a permanent difference, just as others yield gradually to environmental influences.

Lying about forty miles east of Marquette, athwart the entrance to one of the few deep bays on the southern shore of Lake Superior, is Grand Island, true to its name in size and beauty. It is located at the westerly end of the famous Pictured Rocks, and the giant sandstone cliffs on its northern side face the widest part of the lake. The nearly landlocked waters on the inner side afford the only natural harbor for many miles (see map, page xxii).

ANCIENT OJIBWAY CAMP GROUND

Grand Island was the camping place of the Ojibway Indians for many centuries. Later there was established on it a trading post with the interesting life incident to such frontier outposts. When tourist travel to Lake Superior began, in 1855, on the completion of the first lock at Sault Sainte Marie, this precipitous part of the coast with its multicolored cliffs and castellated rocks could be seen at close range from the decks of passenger steamers. Grand Island, with a shore line of about 40 miles and comprising about 1,400 acres of heavily forested land containing lakes, ponds, and flowing streams, was always the resort of wild game, the deer in particular being attracted by several natural salt licks near its center.

When a youth, I camped each season with older members of my family on the mainland opposite its shores, where so abundant were the trout, deer, wild pigeons, and grouse that only on rare occasions was the island visited. Whenever I ventured into the dark tangled forests of the island, it seemed to me that the deer there had developed a greater degree of sagacity than those roaming in comparative safety throughout the unbroken wilderness on the mainland. Their cunning doubtless was due to the peril of island segregation and

the inherited fear of the Indian and the fur trader, who so long made this locality a general rendezvous and hunting ground.

Providentially, this beautiful island has been saved from the ravages of the ax and the too deadly use of the gun, for a number of years ago it was acquired by the Cleveland-Cliffs Iron Company. Unlike many of the pioneer corporations of the West, this company has always shown a commendable interest in the welfare of the several communities in which it has operated, leaving a fair equivalent for that which must be destroyed. It was this spirit that led to an extended effort to protect the native wild game of Grand Island and to introduce new or foreign species most likely to succeed in a northern region.

Starting with several hundred native white-tailed deer, the wild life was increased by introduction of a dozen elks, a few moose, and some mule deer, caribous, and antelopes. Under close protection the white-tailed deer increased to about 3,000, the elk to about 250, and the moose to a smaller number. The two small caribou bands introduced from Newfoundland came to a tragic end sooner than the others. The mule deer and the prong-horned antelope were entirely unsuited to such a locality and soon perished.

Several hundred Scandinavian game birds were also introduced, and thousands of young Scotch firs were planted to supply them with winter food. These game birds, especially the capercailzie, raised a few broods and then fell victims to birds and beasts of prey. They were unfitted to survive in this new environment with its unfamiliar dangers.

THE ISLAND OVERSTOCKED

The browsing animals eventually became so numerous that the food supply failed, and many of them starved. This was particularly the case with the moose and elk, which nearly all disappeared. In order to save the whitetails from extinction by starvation, the park keepers fed them hay for a time. Even this did not relieve the situation, and an open season on bucks failed to stop the heavy increase.



WINTER CLOTHES GRAND ISLAND FORESTS

Hundreds of deer of both sexes were captured and shipped alive in crates to other States, for restocking purposes. The larger early shipments went to Pennsylvania, where these big, vigorous animals helped build up the present numerous stock.

A HERD OF CARIBOU PLUNGES TO DEATH

The first herd of Newfoundland caribou introduced here perished on a stormy winter night, going headlong to their death while trying to escape from a stray timber wolf. They plunged over the wooded top of one of the higher cliffs to the ice-mantled shore of Lake Superior (see illustration, page 237). The herd was a victim of the sheeplike influences that causes these animals to follow a leader, and to regard long-distance flight rather than cunning evasion, the best means of eluding a pursuing foe.

The next importation of caribou was badly infested with both species of warble-flies that have always proved such a dreadful and unsightly affliction to the caribou on their native island. On Grand Island, being unable to suffer and recover as in their original home, these animals also came to a pitiful end.

A wolf crossed from the mainland on the ice, and crawling beneath the game fence

confining the animals to the higher ground, soon put an end to the mule deer. They lacked the elusiveness of the whitetail. As might be expected, the antelope found the few clearings too small for their roaming habits, and in the deep snows characteristic of the upper lake region they soon gave up the struggle for existence.

During later years coyotes invaded Grand Island, where they were a menace to the young game animals. The danger from them, however, has been kept down by persistent trapping, a considerable number having been captured.

The moose at first thrived and bid fair to succeed in a country adapted to their needs, but crowded by the tremendously increased numbers of white-tailed deer and elk, they refused to travel the frequented runways of their uncongenial neighbors and secreted themselves in a swamp bordering a small lake. There lack of food and free range brought on disease, and these stolid animals vanished, the usual result with them when too closely confined, a fact that accounts for the small number of them found in zoological parks.

The native whitetail, therefore, won the day against all its enforced companions except the elk. These two species here

demonstrated that they were the best adapted for the unoccupied ranges throughout most of the easterly part of the country.

The unrestricted natural increase of big-game animals on any island, however large, will finally bring them face to face with an inescapable enemy, starvation, through lack of enough forage to meet a constantly increasing demand upon it.

If, however, the long and costly effort to make Grand Island the permanent home of many immigrant species proved disappointing, an unexpected reward came in the development of a beautiful herd of albino white-tailed deer. A characteristic feature of the Michigan deer has been its general uniformity in physical appearance. Although more deer have been killed in this State in the last 50 years than in any similar area elsewhere, there have been few freaks in antlers or great extremes in weight. Albinism has been equally rare.

THE AUTHOR FIRST LEARNS OF THE ALBINO BUCK

Years ago I received word that a fine albino buck had been seen frequently on Grand Island, coming to a little pond on the easterly side. Taking a camping outfit, a canoe, and a guide, I passed several days and nights watching the pond, and although the ordinary deer came during the day or became visible under the jacklight, the white buck did not appear.

The following year the quest was no more successful, and when I heard that on the opening of the season the white buck had been killed, it was a consolation to know that the body was in the hands of a taxidermist, preparatory to being added to the little museum at the island hotel. There I took the measurements of the antlers and the body.

To show what a striking picture such a marblelike figure would present with a background of black, the mounted animal was carried one evening to the edge of the forest, in which it had once roamed, and the flashlight was fired (see page 243). I felt quite confident from the age of this buck that white descendants would be found some time, and a careful watch was maintained throughout the island.

In the fall of 1915, a good-sized albino buck was observed loitering about the box traps set for capturing deer to be shipped. It was taken with little effort. Upon its



HE PREYED NO MORE ON DEER

Wolves crossed to Grand Island over the ice from the mainland from time to time and created havoc among the numerous game animals. Guns, traps, and poison were all used to keep the number down. One of them is shown here and indicates the size of these powerful beasts.

removal to temporary quarters it was found that the buck was suffering from an injury to the spine and was unable to stand.

KEEPER COULD NOT CHANGE COATS

The rarity of such a capture being recognized, a regular attendant was placed in charge of the buck and it was fed and watered daily in a reclining position. After a month it had recovered sufficiently to walk about, and by spring was in good condition.

At this time an odd occurrence took place. One morning when the faithful care-



WINTER BUILDS PALACES OF ICE ON THE SHORE OF GRAND ISLAND



THESE PICTURED ROCKS AT THE NORTH END OF GRAND ISLAND WERE THE SCENE OF TRAGEDY
It was over this precipice imported Newfoundland caribou were supposed to have met their fate when chased by a timber wolf (see text, page 234).



A YOUNG BULL ELK FEEDS ON MAPLE LEAVES ON THE SHORE OF ECHO LAKE
This photograph indicates the browsing habits of the animals when other forage is not available
(see text, page 246).



THE WHITETAIL REJOICES IN WINTRY SOLITUDE

When cold weather sets in, few people are left on Grand Island, and the game animals wander about the snow-clogged forest at will.

taker approached the stall, he was surprised to see the buck exhibit the greatest terror and plunge about in a way that threatened new injuries. The keeper withdrew at once and considered the cause of the deer's alarm.

Remembering that on that day for the first time since taking charge of the deer he was not wearing his winter fur coat, he donned the garment. The buck became docile at once. This proved that animals usually dependent upon scent may associate an outward garment with identity. Possibly, also, this old fur coat had an odor of its own!

The idea of establishing a herd of white deer now suggested itself. For this purpose four red does were captured and placed in a fenced range with the white buck.

A few weeks later the project was stimulated by the discovery of a female white

fawn a day or two old in a thicket near the island hotel. With careful attention, and in the company of another fawn, it grew rapidly in captivity.

During the earlier months this fawn had the usual row of white spots on the back and sides, and although there was only a slight difference of shade between these and the uniform white of the body color, they were conspicuous in the same way that white silk needlework on a background of white silk may show, in delicate tint, a varied pattern (see pages 245 and 246).

A RED DOE AND HER WHITE FAWN

The following year one of the red does in the enclosure gave birth to an albino doe fawn, which lacked, however, the apparently brocaded white spots characterizing the one mentioned. By this time the first fawn had become a yearling, and it was



WHITETAILS ARE MAINLY BROWSE-EATERS

In this picture, taken on Grand Island, it will be noted that the ground is covered with an abundant growth of grass, although the undergrowth and branches of the birch trees, as far up as the animals can reach, are practically all destroyed.

placed in the same enclosure with the white buck. Some years later I heard of a yearling albino doe at the State Game Farm, and in a few weeks it was safely transported to Grand Island. Such an addition in new blood proved of undoubted value.

In 1919 word reached me that the white buck had died suddenly in November, leaving only one buck fawn as the future head of the herd. The following spring, however, another white fawn was born. Also favorable news was received that a large albino doe and two white fawns had been seen on several occasions in a remote part of the island, and that they would be placed in the enclosure if such disposition

was deemed advisable. It may be of interest to note that the original buck weighed about 150 pounds, and possessed a rather extraordinary set of antlers, spreading 26 inches, with the terminal points much farther apart than those of any other whitetail I have ever seen.

VELVET ON ANTLERS SNOW WHITE

The velvet on the antlers of both bucks was snow white, giving them a most statuesque appearance amid the green foliage of the forest. The eyes of the local albinos were a very light gray-blue. The doe from the southern part of the State had the red eyeballs usual in albinos. The absence of any pigment in the layers of the retina of this latter individual disclosed the red blood vessels, making it very susceptible to a bright light. The second buck differed from the original one in being somewhat larger, but

it never had more than two spikes on antlers about 18 inches long, the left one slightly forked (see illustration, page 244).

The albino deer shed the white summer coat at the usual time of moulting, and it was replaced by a heavier and thicker covering, though not quite so long as the gray winter coat of the normal animals. The skin was a light pink, showing plainly through the thin summer coat, in contrast with the dark epidermis of the other deer. The hoofs and bare skin of the nose were a pearl-gray, instead of black, and the velvet on the growing antlers was white. When free from the velvet, the antlers had the usual brownish-yellow coloring, the

only external part of the albino deer that resembled the normal ones in color.

Up to the time of the Grand Island experiment the effort to perpetuate an albinistic strain of animals had been largely confined to white mice, rats, white rabbits, and poultry; for in the larger animals this occasional variation from normal commonly results in the elimination of such animals by man or predatory animals. Furthermore, the opportunity for such an experiment occurs rarely because of the difficulty of finding a mate for an albino.

Albinism occurs in all organic life. Examples have been noted among many species, including moose, elks, deer, porcupines, beavers, muskrats, squirrels, robins, swallows, crows, blackbirds, woodcocks, and many wild fowls; also in frogs, fishes, insects, and several forms of plant life.

The condition is due always to the failure of the organisms to secrete the normal pigment. This deficiency in coloring affects the skin, hair, retina of the eyes, and the hoofs of most quadrupeds. Partial albinism is frequent. In New Brunswick I saw a number of deer with white patches of various patterns, which gave some of them a strikingly odd appearance.

I had been under the impression that the first offspring of albinos were usually white, and that on and after the third generation they were uniformly so, following the rule of inheritance shown by silver and black foxes. Several biologists, however, had argued that "albinism, being a purely



WHAT IS THAT?

This deer, caught by the flashlight on the shore of Echo Lake, pricks up its large ears and gazes inquiringly toward the source of the sudden illumination. It does not appear seriously alarmed. Probably it wonders what sort of lightning comes out of the ground.

recessive character among mammals, should breed true from the first." That this conclusion is sometimes erroneous was shown when one of the white does gave birth to a normally colored fawn, although the white buck was the only male in the enclosure.

There were many nature lovers, vitally interested in the efforts of science to produce and perpetuate new variants of existing species, who were gratified to know that as time went on specimens of this new and beautiful phase of the whitetail might find representation in other parts of the country.

Unfortunately, some years after the albino deer had increased and seemed destined to establish a large herd of these



THIS MOOSE CHEWED TOBACCO

A young bull, probably raised by some woodsman from a very early age, had an inordinate desire for "the weed." He roamed the roads and trails on Grand Island and, whenever he met anyone, approached with outstretched muzzle mutely begging for his favorite dainty. If this was not forthcoming, he sometimes butted the offender to indicate his displeasure. This animal appeared to be an outcast among his kind, for he was not permitted to enter the swamp with the others, and no other moose was ever seen with him.

beautiful animals, some strange disease killed many of them in rapid succession. A new and suitable enclosure was provided for the survivors, but the losses continued.

When only a few were left, they were turned out to mingle with the normally colored deer on the island, where one was occasionally seen. Deprived of the selective breeding that the fence had insured the white strain now appears almost to have disappeared.

The only albino deer I have ever seen in northern Michigan, with the exception of those mentioned above, were one found near camp and another killed during a hunt one night in 1882. At that time jacklighting was lawful in the Lake Superior region and elsewhere, but some other sportsmen and I had come to believe that killing deer by using a shotgun and jacklight was unsportsmanlike and only justified as an

easy means of getting venison needed in camp. Even on emergency occasions, it was agreed that we should use a rifle and kill only bucks.

One night I paddled a hunting companion to a promising location, but after we had waited for an hour the only sign of a deer we saw was a pair of glowing eyes well back in the forest. Because of the distance between the eyes, my companion felt quite certain that it was a large buck.

His shot was followed by a convulsive struggle that indicated that the deer was down to stay. We paddled to the shore, and the marksman mounted the bank and soon called out, "It is not a buck, but is a woolly doe, so I am satisfied."

Joining my companion as he started to drag the deer to the water, I saw that it was an extraordinarily large doe almost as white as snow, the outer covering consisting



THIS WAS THE ORIGINAL ANCESTOR OF THE ALBINO DEER ON GRAND ISLAND

First observed on the island in 1912, it was killed by a pothunter in 1914 when about seven years old. At the time of its death it had nine white descendants. The author made this photograph of the mounted animal, none having been taken of it during its life (see text, page 235).



THE FIRST DESCENDANT OF THE WHITE BUCK WAS A DOE

This photograph was taken when she was three years old; she was in her thin summer coat, and her pink skin plainly showed through the hair.



THE SECOND ALBINO BUCK, CAPTURED IN 1915, WEIGHED 160 POUNDS

The curious form of its antlers, one a long spike and the other a single fork near the tip, was reproduced for several years in succession (see text, page 240).



THE SECOND WHITE FAWN BORN ON THE ISLAND

This doe, of normal color, was shy and retiring with her unusual offspring. The youngster lacked the brocaded white spots of the first albino (see text, page 239).



THE WHITE BUCK HAD A MIXED HAREM OF WHITE AND RED DOES

In an attempt to perpetuate the odd albino strain, keepers placed him in an enclosure with four naturally colored females (see text, page 239).



A WHITE FAWN WAS FOUND IN 1916 WHEN ONLY A DAY OR TWO OLD

It was reared on a milk bottle with a normally colored fawn of the same age (see, also, page 246). The clear white spots on the albino show faintly against the duller white body color.



NORMAL FAWN AND ALBINO GREW UP TOGETHER

The white one was reared on a milk bottle with a normally colored fawn of the same age. They are shown here in the fall after they had lost the spots for the heavier winter coat (see, also, lower picture on page 245).

of fine white wool closely resembling cotton. The short distance the deer was dragged removed most of this strange covering from the underside, and the pelt was not saved. I have always regretted that a part of the skin was not kept for study by a biologist, for since then I have never seen anything like it.

ELK INTRODUCED ON GRAND ISLAND

The elk was one of the few game animals introduced with initial success on Grand Island, only to become greatly reduced like most of the others, through the lack of forage as the increasing number of animals overstocked this limited area.

The experiment gave us a good demonstration of what may be expected from conservation carried to an unreasonable extreme. Despite several similar examples, it is still very difficult to bring the majority of people, even many sportsmen, to appreciate the fact that the laws of increasing numbers and decreasing natural food supply apply to game animals exactly as they do to domestic stock, whenever they are held and protected within any isolated and more or less definitely limited area.

Although elk are mainly grazing animals, they are also fond of browsing. On Grand Island they ate maple brush and other bushes in summer and cedars and other conifers in winter.

One night, when trying to get a flashlight picture of deer at Echo Lake, Grand Island, I was surprised to find a bull elk standing in shallow water biting off

the leaves from an overhanging maple. I took its photograph (see text, page 238).

The following night a cow and a calf elk ran along the shore of the same lake, affording opportunity for another picture. For some unknown reason, on this occasion the flashlight powder exploded with such force that it blew the flashlight machine to pieces, with a report that was heard several miles away.

The concussion extinguished the jacklight and John anxiously asked if I were hurt. Fortunately, beyond having the trigger guard bent around my fingers and my wrist lamed by being violently swung against the bow of the canoe, I suffered



THE ALBINO WAS RAISED BY HAND

After being treated as a member of the family, the fawn recognized its human friends even after it had acquired its later coat of white.



THE FIRST ALBINO DOES PERPETUATED THE WHITE HERD

The eyes of two were light gray and those of the other were red, in striking contrast to the black eyes of normal deer.



THEY OBSERVED INTRUDERS WITHOUT FEAR

The approach of the photographer to take this daylight picture aroused the interest of the deer on Grand Island, but did not alarm them.



FRIENDLY ASSOCIATES DREW NO COLOR LINE

Both in and out of the enclosure the normal deer associated with the white animals without the least sign of any recognition of their difference.



GRAND ISLAND ELK SEEK FOOD IN WINTER

A dozen of these animals placed here in 1905 thrived at the start, increasing gradually to about 250. With a proportionate increase in the native white-tailed deer, the natural forage declined so as to require winter feeding. Following a later decline in the summer food supply, the elk rapidly diminished. While a range of about 12,000 acres proved inadequate, the experiment showed that elk could be easily established in the State on a more extended range. In 1930 only about a dozen elk remained on the island.



THE OTHER COW ELK DISDAINED TO LOOK

This photograph and the one accompanying it were taken on the same night at Echo Lake on Grand Island.



ONE COW ELK LOOKED OFFENDED

Unwittingly she posed for this flashlight on the shore of Echo Lake. The author obtained a rich "bag" with his camera that night.



A SMALL ALBINO BUCK, HIS ANTLERS SHED, ACCOMPANIED TWO FAWNS ON WINTER FEEDING GROUND

no personal damage. The next day we recovered from the shallow water the missing parts of the apparatus.

This accident convinced me that it would be safer to have the flashlight fired from an upright wooden support than by hand although no previous difficulty had developed. It was evident that this flash was a very quick one, for it caught the calf

running with all four feet off the ground. On one of my subsequent visits to the island in the late fall, when snow covered the ground, the elk were gathering in small herds. I placed some hay near the border of a forest glen and from a blind built nearby had the satisfaction of taking some photographs of native-born elk in northern Michigan.



CHAPTER XII

Salt Licks

NATURAL wet, salty places called "salt licks" occur throughout most of North America, as well as elsewhere in the world. Many of them have pointed out the location of salt deposits that have been developed commercially.

To these licks come the wild ruminants: deer, elks, caribou, moose, mountain sheep, and mountain goats, and, at times, such smaller animals as rabbits and porcupines. Huntsmen learned of this habit of game animals in the dim past, and took advantage of it in stalking their prey.

Some boggy salt licks, such as Big Bone Lick of Kentucky, have become famous from the records they have furnished of the animal life of former days. When Kentucky was settled, Big Bone Lick was being used by buffaloes, elks, and white-tailed deer. The buffalo and the elk disappeared from that region many years ago, but their bones are found embedded in the earth there with similar remains of their ancient forerunners, the mastodon, and a fossil elephant, the megalonyx, and the horse. Large animals, even in forgotten eras, loved salt.

In recent years licks have been ideal hunting grounds for the wild-life photographer. Where natural salt licks are lack-

ing, the camera hunter may make them by placing salt on the ground or in holes bored in logs. Animals, through their acute sense of smell, quickly locate man-made licks.

Game hunting at such places would result in wanton destruction, for the salt attracts nearly every animal living within a considerable radius. In or near a deer range anyone can kill game at licks both in and out of season with little danger of detection, and for this reason several States now prohibit the use of licks in hunting.

SALT LICKS OF THE LAKE SUPERIOR REGION

A few years after my first visit to Whitefish Lake, I discovered that the large number of deer coming to the slough at the south end of the lake were attracted there by several salt seeps. The ramifications of the deer trails indicated that the animals came from a radius of about ten miles. They came singly, except when the does were accompanied by their young, although occasionally 20 or 30 deer might be seen at one time in the vicinity of the licks.

Being interested in the nature of salt licks, I asked Professor Lane, then of the Michigan College of Mines, to pass a week at the camp on Whitefish Lake for the pur-



SALT IS IRRESISTIBLE TO DEER

To prevent small animals firing the flash, a balsam top was placed over the salt, raising the string a couple of feet, where it was not so noticeable in the mass of branches.



WHITE-BANDED BLUE BUTTERFLIES GATHER ON THE WHITEFISH LAKE SALT LICK

At another natural lick on the Tobique River, New Brunswick, the author saw hundreds of yellow butterflies congregate to sip the saline waters.

pose of locating and chemically analyzing the licks in that vicinity.

We first visited the "buck log," back of which lay one of the most frequented salt licks on the eastern margin of the slough. On our arrival I pointed out a muddy pool about 30 feet long by 10 wide, just above the ordinary water level of the slough.

"There," I remarked, "is the best place I know for a sample."

To this my companion replied, "Judging from the disturbed condition of the mud due to the visits of many deer, I should say it is the worst place to get a specimen. It must contain the minerals of the animals' urine as well as those properly in the lick."

He suggested that the thing to do was to go four or five feet up the slope from the water and dig down several feet to tap the water at a point free from surface contamination.

The saline waters in this region, as in other areas, seep down from adjacent hills to moist places near the margins of streams and lakes. The water collected in the bottom of our small pit, from which we took a sample. About 100 yards farther up the slough at another lick we repeated the

process, and then crossed to the opposite bank and took two more samples under similar conditions. The slough is bordered on both shores by high, irregularly sloping hills covered with strata of sandstone.

Subsequent analyses of these samples showed a percentage of salt that equaled, or even exceeded, that from some of the best salt wells of southern Michigan, where salt production has been highly developed. The fact that salt licks have been found below great sandstone deposits throughout much of northern Michigan, as well as at many places on the north shore of Lake Superior under similar conditions, may indicate the presence near these licks of salt in deposits extensive enough to be of future economic value.

BEHAVIOR OF DEER AT THE LICKS

It was always interesting to watch the deer come slowly down a wooded runway to a lick at the foot of a sloping bank. When near, they would stop for a moment and look about carefully, and then descend the last short distance at a trot. Standing in the mixture of mud and water character-



THE SALT LICK ON ST. IGNACE ISLAND, ONTARIO, HAS HAD MANY VISITORS

This view shows part of a great salt lick formerly used by caribou and during later years by white-tailed deer and moose. The saline clay has been eaten away to a depth of from two to five feet over an area of about 40 by 60 feet (see text, pages 200 and 201).



PORCUPINE AND VARYING HARE TOOK THEIR OWN PICTURES AT AN ARTIFICIAL LICK

Rock salt was placed between stones to attract the deer. When the flash was fired, the developed plate showed in front a salt-loving porcupine, while in the rear was a varying hare, of similar taste, in the act of running into a string attached to the stake behind.



INNUMERABLE DEER TRACKS ONCE POCKED A SAND BAR NEAR THE SALT LICK IN WHITEFISH LAKE SLOUGH
Of late years, however, the animals have so decreased there that on a visit to this spot in early September, 1930, the author saw not a footprint.



THE CAMERA CAUGHT A NIGHT VISITANT TO THE SALT LICK AND ITS REFLECTION

Deer, irresistibly attracted to the saline water, watch for opportunities to gratify their tastes when wolves are absent (see text, page 259).



FOREST NEIGHBORS MEET AT THE LICK (SEE TEXT, PAGE 260)

The yearling buck was much more interested in the glowing, starlike jacklight than in the porcupine, which also had come for a taste of salt.

istic of such places, they usually faced their back trail.

After taking a noiseless swallow or two of the saline water, they would raise their heads and look cautiously about. This action was repeated as long as they remained in the lick, and showed the eternal vigilance they must exercise when they suspect that wolves may be near.

In the case of the moose, however, at licks on the north shore of Lake Superior, as well as in New Brunswick and Alaska, their heads would remain lowered for some time and they made a sucking sound as they took repeated swallows. The short necks of the moose and their long front legs make it necessary for them, when drinking at a level place, to spread the forefeet wide apart, or bend the knees in order to reach the water (see page 260).

The quantity of saline waters taken by some deer is extraordinary, often amounting to a gallon or more. On occasions, when they drank so deeply, they would remain one or more hours in or about the lick, and frequently would urinate while standing in the water. I never knew of adult deer dropping their excrement while in a lick.

The lack of social instinct among the whitetails is well shown by the aggressiveness of the stronger animals at salt licks in driving all others away until their own desires are completely satisfied. When a large deer is already in a lick, others may come in from different directions until a considerable number stand about in close enough proximity to give the idea that they constitute a herd, but careful observation usually shows that they are keeping back in deference to the animal in possession.

licks in New Brunswick

In the Province of New Brunswick there are probably more animal licks than in any similar region in the East. They are now frequented by deer and moose, but until the comparatively recent invasion of this region by these two animals, they were used by many caribou.

I was once concealed with my camera at one of the licks located on a small tributary of the Tobique River, and while waiting for a deer or moose to appear, saw approximately 500 big yellow butterflies alight on tiny projecting lumps of mud scattered abundantly over the surface of the water in the lick. Each butterfly thrust its proboscis

into the mineralized water and appeared to be sucking it up.

While this was going on, a large buck whitetail came out of the alders and headed for the middle of the lick. The moment he arrived in the midst of the butterflies, they arose in a confusing cloud of fluttering wings, almost concealing him. He gave two startled leaps out of the yellow mass and disappeared in the bushes.

MINERALS IN NEW BRUNSWICK LICKS

I delayed taking samples of one of the best licks until the day I was to depart. It had rained all the previous night and by morning the lick was too full of rainwater for me to obtain a sample carrying the normal mineral contents. Not having tools to dig a pit in the hill slope to catch seep water, I was compelled to forego the test.

Fortunately, a few years later my friend, Donald R. Dickey, whose wild-life photographs are well known, took a series of samples for me. They proved to be an alkaline carbonated water containing iron, magnesia, and bicarbonate of soda, with relatively little salt. These samples were taken from the open licks where the animals drank.

Mr. Dickey writes that these waters are remarkably "soft," and that the presence of hydrogen sulphide seems to form a definitely attractive element. The presence of sodium chloride in even dilution as 2.66 grains to the gallon, or less, appears to be equally attractive without the hydrogen sulphide. The unexpected dilution of the mineral content indicates the reason for the tremendous consumption of these waters necessary for the satisfaction of the game. That the animals can detect the presence of salt in such a dilute solution is evidence of their keen sense of taste.

The lack of salt in these licks corresponds to conditions in the licks of the upper Yellowstone Valley, Wyoming. The Yellowstone licks, located on flats near the river, receive their mineral contents from springs on the adjacent slopes carrying soda, sulphur, and iron. The licks there are mainly mineralized mud, which is eaten by the deer, elks, and moose. I found, on the Kenai Peninsula, near Skilak Lake, Alaska, the largest and most used natural lick I ever saw. It was frequented by great numbers of moose.

Dr. Harold C. Bryant, of the California State Game Commission, has published an



THIS COW MOOSE WAS PHOTOGRAPHED BY DAYLIGHT AT EIGHT FEET

She was drinking quarts of saline-sulphur water at a New Brunswick natural lick. Her short neck and long legs compel her to bend her knees or spread her forelegs widely apart (see text, page 259).

interesting illustrated account of the most famous licks on the Pacific coast. They are situated in the part of the Trinity National Forest lying within a California State game refuge covering about 65,000 acres. Deer were formerly killed by thousands at these licks.

In Glacier National Park mountain goats have the habit of coming down the slopes to a lick near the base, at which place they can readily be seen and photographed without the necessity of climbing to their almost inaccessible haunts. At the headwaters of the Athabaska in the Canadian Rockies are licks that also are visited by goats.

Many more animals visit licks in spring and summer than later when the weather

becomes cooler. That licks are visited sometimes at late dates, however, was shown once at the slough on Whitefish Lake, in the middle of November, when the ground was covered with about six inches of snow. There I saw a lick whose surface was a trampled mass of mud, snow, and ice, where several big bucks had paid a final call before winter sealed the resort.

The salt licks about the south end of Whitefish Lake not only attracted deer from a wide area but also formed a gathering place for porcupines. Some flashlight photographs taken there showed a deer and a porcupine on the same plate (see page 258). These pictures indicate no undue familiarity between the animals.

CHAPTER XIII

Timber Wolf, Coyote, and Black Bear in Northern Michigan

THE timber wolf is an interesting animal, but to gain an accurate knowledge of its habits is difficult. To a considerable extent its habits must be determined by inference, so infrequently does this night prowler of the forest come under direct observation.

No animal possesses greater sagacity in avoiding its only dangerous enemy, man, and few show greater cunning and persistence in seeking their prey. Fear of man is the predominating characteristic of the gray wolf.

From earliest childhood we have heard of the savage nature of the wolf and have read harrowing accounts of men being pursued by these bloodthirsty creatures, from whose jaws they escaped only by nimbleness in ascending a tree or perhaps by barricading themselves in some wilderness cabin. Shelter seems always conveniently at hand in such stories. It is therefore not strange that in the popular mind the timber wolf is still regarded as the arch enemy of man. But this is offset by the best proof that man has thoroughly terrified the wolf.

CONTRAST OF WOLF AND DOG

The wolf and its tame brother, the dog, present the greatest contrast in their respective attitudes toward man. The wolf is distrustful and cunning, skulking in the shadows of the night, intent upon rending to pieces any weaker animal, but having a dread of man so overpowering that it not rarely dies of overexertion in desperate efforts to escape after being trapped. The dog, affectionate and loyal beyond comparison, represents among animals the highest and most intelligent response to kindly treatment. Reversion from dog nature to that of the wolf begins under a cruel master or when the dog is half starved.

Wolves have had every reason to fear their human foe, for they have been trapped, poisoned, snared, shot, harassed by hounds, and outlaid by a price upon their heads. The survivors know that however much the other animals of the forest may stand in awe of them, man is ever their relentless and successful enemy, and that only by the exercise of all their highly developed senses can

they hope to escape the same miserable death that they so ruthlessly inflict upon their prey.

In the many years passed in some of their forested ranges on the northern continent, I have never seen more than 20 wolves, although I have heard them howl upon hundreds of occasions and have seen their tracks in numberless places.

COURAGE AND FEROCITY EXAGGERATED

Northern Michigan was, and still is, one of the favorite resorts of the timber wolf, because of the dense forests and the abundance of deer and rabbits. Here I have shot a few and trapped or poisoned a dozen or so about the camp. This is a gratifying record compared with that of the legion of hunters who roam this section every fall. Many of these in more than half a century have yet to see or to kill their first wolf.

Nowhere in America have I been able to get an authentic account of a man's being deliberately pursued or injured by a wolf. Out of the multitude of such stories it may be that one or two are true, for the possibility always exists of encountering an individual animal that lacks the caution of its forebears, or that, living in a totally uninhabited country, has not inherited the fear of man.

Twice, however, the carcasses of deer I have killed and left out overnight have been eaten by wolves. Once I had shot a deer across a small lake, and I did not go after it until morning. I found only a few scattered remains. On another occasion I was trailing a wounded buck in the snow and was forced to suspend the search at dusk. The following morning I noted wolf tracks along the trail beyond the place where I had turned back the night before. A few minutes' travel brought me to the blood-stained snow and the bones of the deer stripped of flesh. In both of these instances there was, of course, no trace of human scent, and the wolves had had no hesitation in devouring the carcasses.

Many years ago we observed wolf tracks on the sand beach at the end of Whitefish Lake one day and set a large steel trap in the water of the creek at the place where a

deer runway crossed it. That night we heard a wolf howling.

Next morning as I paddled into the slough, I fired a shot at a pair of black ducks passing overhead.

The trap was gone from the place where it had been set, and some of the alders in the vicinity had been uprooted by the dragging clog. Upon reaching the bank, I saw that other alders had been chewed to shreds, and many of them were still dripping with blood from the mouth of the wolf, which had bitten them in its frenzy.

I returned to the camp for the rifle and then took up the hunt again. I soon came upon a large wolf lying on the ground with its head between its paws, almost as if asleep. It was dead, but its body was still warm.

It had probably been held fast by the clog until it heard the shot fired at the ducks. Then in its frantically renewed efforts to escape it had chewed the alders in its way. When it reached the hilltop, its accumulating terror and exhaustion undoubtedly resulted in its death.

Adam Moore, the famous New Brunswick guide, once told me that whenever he set out steel traps for a bear he always placed them near a watercourse so that the animal could drag the trap and clog to the water. Otherwise, he said, the bear would soon die of fever and exhaustion, and often the pelt would be spoiled before the trap could be visited.

WOLF COLLAPSED BEFORE CAMERA

That the wolf's dying from fright was not an extraordinary phenomenon was shown three years later in the same locality. Again a wolf was trapped one night and made its presence known by howling. On the following morning, with rifle and camera, I visited the spot.

The trap was missing from the place in which it had been set, but the animal had not gone more than 20 yards when the log attached to the chain caught and held it. As I approached, the wolf raised itself to a sitting position, but while I was clearing away the thick alders in order to take a picture, it sank to the ground with every appearance of complete exhaustion and only after a severe prodding would it rise again.

At the first snap of the camera, the animal collapsed and refused to move. I certainly had never expected to feel sympathy for the plight of such a marauder, but this animal's bloodshot eyes, protruding tongue,

and entire lack of resistance would have appealed to its most relentless enemy, and I hastened its end with a shot.

From its condition it was obvious that the animal was in the throes of death, not from any injury, but from an overpowering mental and physical strain. It had succumbed to terror, though it weighed 80 pounds and was in the best physical condition.

WOLF SHUNS DEER TOUCHED BY MAN

One of the most conclusive proofs of the wolf's fear of a human being is the fact that every season thousands of deer carcasses in the Lake Superior region, left overnight on the ground or hung from branches within reach, remain undisturbed because of the slight scent left by the hunter. Even the entrails left after the deer is dressed remain untouched until all trace of human contact has disappeared. Even the most skeptical should agree that a wolf is not likely to attack a wood traveler in the flesh. It shrinks away in fear whenever it discovers any human scent about even a slain deer.

The cunning and endurance of the timber wolf were exemplified on Grand Island in the fall of 1896. The first snow betrayed the tracks of a wolf, and investigation disclosed many carcasses of deer killed by it. Several of the introduced mule deer had fallen victims.

A large number of traps and poisoned baits were put out, but to no avail. Immediately a dozen of the best shots in the vicinity were employed to hunt the animal. They took up the trail in the snow and followed it continuously by day for four days.

At some time in the hunt the animal was slightly wounded, and thus its wariness was increased. Relays of hunters followed it all day and sometimes with lanterns at night for about two weeks before it finally fell.

The value of the deer destroyed by this single animal and the wages paid the hunters for killing it totaled a loss estimated at \$1,500. That an animal on an island, where it could readily be followed in the snow, was able to escape such a number of experienced hunters for so long a time shows how hopeless would be a similar pursuit on the main shore, where the avenues of escape are incalculably greater.

In recent years the deer of upper Michigan have greatly changed their habits. Because of the stopping of migration and the rapid destruction of timber on the hemlock ridges and in the cedar swamps, the winter



CONSTANT VIGILANCE IS THE PRICE OF LIFE

This deer was photographed as it stood looking and listening intently for signs of a skulking foe in a wolf-infested area (see text below).

ranges for deer in this region have become more and more restricted.

For a time the deer seemed doomed to quick destruction through attacks of the ravenous wolves. Compelled to gather in yards by dozens and sometimes by hundreds, with well-beaten trails throughout yarding places surrounded by deep and impenetrable snow on all sides, they were easy prey. Within a few hours a single wolf could destroy dozens of them. It has been estimated, from the carcasses found, that more than 2,000 were killed by wolves in the vicinity of Whitefish Lake in the four years preceding 1908.

On this page is a flashlight picture of one of the few deer I saw on Whitefish Lake in an entire season of this period. Formerly to see 25 in a single day was not unusual. It is, therefore, with pleasure that I have also depicted the big gray timber wolf trapped the following night on the same trail used by this particular deer. I heard its mournful howl a mile away when the

trap was sprung. The following day a camera shot preceded the rifle bullet that ended its cruel life (see page 264).

This was the nineteenth wolf trapped, poisoned, or shot in the vicinity of my camp in the course of 30 years. The total number is equivalent to the offspring of only three female wolves for a single season.

The bounty on wolves in Michigan for some years varied from \$35 to \$50 a scalp, and every effort was made to wipe out this enemy of the deer. In recent years the old bounty system, which proved inadequate and led to extensive frauds, was changed through cooperation with the Biological Survey to a system employing well-trained hunters. It is hoped that the same success may be attained here that has characterized the work of this Federal bureau in its war on predators in the far West.

My dear Shiras:

Many thanks for your letter of the 8th. Come and take lunch with me on Tuesday at 1:30, when we can talk matters over. I



THE WOLVES HAVE HAD A FEAST

Many deer are killed by their predatory foes in northern Michigan when the lakes and streams are frozen over and the animals are in yards. Most of the victims were large bucks, which become exhausted more quickly than does and younger males.



AN 85-POUND TIMBER WOLF WAS TRAPPED ON A DEER RUNWAY

This cruel marauder was captured on July 29, 1907, near the author's camp in northern Michigan. Immediately after being photographed the creature collapsed from fear and overexertion and lay in a dying condition as a bullet ended its life (see text, page 262).



THE ARCH DESTROYER MENACED GAME ON GRAND ISLAND

In the fall of 1896 a female wolf weighing about 60 pounds committed ravages among game creatures. After organized hunting by day and night it was killed. The photograph is of the mounted animal, which is preserved at the hotel.

am delighted that you can postpone your trip long enough to write that piece. It is a fine thing to do. By the way, I have something interesting about passenger pigeons for you.

Sincerely yours,
(Signed) THEODORE ROOSEVELT.

On the day after I received this letter, I took luncheon at the White House. It had been expected that the Governor of Arizona would also be present, a man who the President declared was a unique character.

The Governor, however, was called home unexpectedly, and in his place the President said he had asked "two young fellows." They proved to be the Secretary of State, Elihu Root, and the Secretary of War, William H. Taft. Both had remained over after a cabinet meeting.

During a discussion at the luncheon table on nature faking, I told how, with the assistance of a guide, I had endeavored to play a prank on a new and inexperienced chap at the Michigan camp.

A JOKE ON THE JOKERS

The night before, timber wolves had been heard howling in an adjoining swamp and the newcomer inquired what the prospects were of shooting one of the wary creatures. We told him that it was necessary only to rub *asafœtida* on his clothing and on the soles of his shoes and then walk to the windward of the swamp. Curiosity, we said, would prompt the animals to investigate.

Shortly after the ambitious wolf hunter had departed, we heard several shots in the direction he had taken, and an hour later he was seen hauling across the clearing the



THESE TIMBER WOLVES WERE KILLED NEAR WHITEFISH LAKE

Next to man, they are the most destructive foe of white-tailed deer in the upper lake region. They hunt singly, in pairs, or in family groups of parents and young of the preceding spring, but not in large packs as commonly believed.

body of a large gray animal that proved to be an immense timber wolf.

Replying to our questions, he told how he had walked a considerable distance when suddenly a curious-looking animal had come running out of the swamp. When it was near enough, he had bowled it over with a single shot.

We asked him to account for the several shots, and he replied, apologetically, that it required two shots to kill another wolf that came out while he was examining the body of the first. He was not able to drag both of the animals back at one time, but he said that he would soon have the other one in camp, provided he didn't have to kill several more on the way!

Since there was a bounty at that time of \$50 on each wolf, exclusive of its pelt, and since only one wolf had been shot in the

vicinity of the camp in many years, the unexpected result of this jest seemed to amuse the small luncheon party.

On the conclusion of the story the President remarked to Secretary Taft: "I wish I could have Shiras' guide to send to the windward of the Senate."

This caused another laugh, for at that time the so-called "gray wolves of the Senate" were busy hamstringing some of the Administration's most important measures.

TALES OF SAVAGE BEASTS

I cannot avoid making some comments on current tales of ferocious animals in American wilds. More or less frequent accounts are published in the press and elsewhere of man-chasing and man-devouring wolves, "fierce" lynxes, "savage" bears, "terrible" cougars, and "revengeful" bull

moose. My opinion, based on observations in the wilderness from Newfoundland and Alaska to Panama and on information gained from others with actual experience, is that few of these accounts are true.

Tales of the innate ferocity of our wild animals commonly come from sensational writers or other persons who have little personal knowledge of the habits of the animals. Few would be able to distinguish the hoot of an owl or the cry of a loon from the howl of a wolf, and all love to enlarge on the imagined perils of the forest. Some of the stories are due to imperfect observations and misinterpretations of facts.

However great the perils may be among some of the animals of the African jungles, the situation in America is very different. Probably more persons are injured or killed here in a year by domestic animals than have been killed in the last hundred years by all the wild animals of the forest.

THE GRIZZLY BEAR WOULD FIGHT

The grizzly bear when wounded or defending its young may occasionally show fight, but the old days when these powerful animals in the United States voluntarily stood their ground are gone forever. The high-powered firearms of civilized man have taught the large carnivores that their only safety lies in flight, and the scent of man has been so closely associated with these weapons that a taint of his hated odor on the passing breeze is usually enough to send the beasts off in panic-stricken flight.

Among the huge brown bears and grizzlies of Alaska exceptions to this general rule occur from time to time. Such exceptions are difficult to understand in view of the testimony of many experienced hunters that as a rule the scent of man carries terror to these great animals also. Authentic instances have been recorded in recent years of these bears attacking man, but most of the attacks have been by animals wounded, embattling for their young, or angered by a threat to their hidden store of meat.

Except in certain parts of the Alaska wilds an unarmed man may go into any part of North America in complete safety so far as wild animals are concerned. To the thoroughness with which the large mammals of this continent have learned the lesson of man's superiority most of them owe their continued survival.

As a sportsman, I believed in or accepted many of these popular fallacies. Close

observation of the same animal for hours at a time and year after year have shown that in a single season of camera hunting more facts can be obtained concerning our big game and its ways, in daylight and in darkness, than will ever be discoverable during a dozen seasons of shooting with the rifle.

COYOTES, NORTH MICHIGAN NEWCOMERS

In early days the timber wolf and the Canada lynx were the main predatory animals of the Upper Peninsula of Michigan. It is true that the black bear is also there, but its food is made up so largely of animals already dead, insects, fruits, and other vegetable matter, that it cannot in this region be classed with the destroyers of game. About 1910, however, some scalps taken in that region and alleged to be those of young wolves were submitted for bounties. Doubt as to their identity resulted in their being sent for examination to the Biological Survey in Washington. The scalps proved to be those of coyotes.

The State officials believed an intentional fraud had been attempted by unscrupulous trappers importing skins from the west, but upon being questioned a trapper denied any intent of fraud. He had captured the animals in the northern part of the State.

Further investigation confirmed this statement and from that time coyotes have been known as residents in that region, where they have become widely spread, numerous, and very destructive. Their high-pitched, long-drawn howls, and yapping bark are now heard frequently at my camp on Whitefish Lake. They appear not only on the mainland but on Grand Island and Isle Royale, which they reached over the ice in winter.

Coyotes in North Michigan are large animals closely resembling small wolves in size and general appearance, but of a darker, more reddish brown color like the coyotes of Minnesota and parts of Wisconsin, whence they came. They destroy grouse, snowshoe rabbits, young deer, and sheep and other small domestic animals and poultry.

Their advent has caused considerable alarm, especially to the owners of sheep, for they have been very destructive to flocks. They are a serious menace also to "yarded" deer in winter. Their power of reproduction and the manner in which they adapt themselves to life in the neighbor-



BLACK BEARS ARE PROTECTED IN NORTHERN MICHIGAN

hood of farms and small villages, as well as in the wilder places, cause them to be even more dangerous to wild life than the timber wolf. They are almost the equal of the red fox in their ability to maintain themselves in the vicinity of man.

EXPERIENCES WITH BLACK BEARS

During my early hunting days black bears were to be found all over northern Michigan, northern Wisconsin, Minnesota, and the entire northern shore of Lake Superior. They were nowhere numerous, and were not often seen, and still more rarely shot. They were seen more frequently in the huckleberry season than at any other time, for their fondness for the berries caused them to frequent open places. Their fur not being prime at this season,

few of the many hunters harassed them.

The cool climate that limited the production of berries and other fruits and mast was a factor in preventing bears from becoming as numerous as in some other parts of their range, especially prior to their protection by law in 1920. In all the years in the wilder parts of this area I saw less than a dozen bears, but with some of these I came into rather close contact.

When finally bears were put on the list of game animals, a gradual increase was noticed, with a marked change for the better on the shooting season's being limited to the last two weeks in November. Many had "holed up" on the coming of the snow and thus eluded the army of deer hunters in the woods.

One year, early in September, I was hunting deer in a canoe on Sauk's Head

Lake, northwest of Marquette. I carried a 44-caliber Winchester carbine, which I found heavy enough for deer hunting at that time of the year.

In looking for deer, I saw near the lower end of the lake a large black animal on a high huckleberry-clad rock. As the creature, about half a mile away, appeared very large I thought at first that it was a stray horse that had come along an old logging road. My route led toward that end of the lake and I fixed my eyes on the animal.

Finally a look through my field glasses surprised me by revealing that the supposed horse was a large bear. I at once crossed the lake in order to approach the bear unseen behind the shelter of the low growth bordering the shore. When I was about 200 yards away, the top of the rock became

visible through an opening. To my amusement the bear was lying on his curved back with his four feet in the air solemnly rocking himself back and forth.

The distance was too great for my light gun, and I paddled hurriedly, concealed by the brushy cover, to a point near the rock where an old road came down to the water. There I beached the canoe and ran up the road to get behind the sloping rock and creep nearer the bear.

I had not gone more than 10 yards when I was startled by meeting the bear head on as he came down the road. Stopping at once, I cocked the rifle; but before I could shoot, the bear jumped into the bushes. I could hear him running back along the slope parallel to the road.

Hoping to get a glimpse of him I ran up the road until it turned away from the course he was following; there I dashed into the bushes and in less than 10 feet came upon him again just as he was about to climb over a big log.

Seeing me at such close range, he stood up facing me on his hind legs. The impetus of my approach carried me a step nearer. In trying to stop, I tripped and as I fell to my hands and knees attempted to fire the gun point-blank at the bear. I forgot that I had let the hammer down as I entered the bushes a few moments before.

My mistake may have been fortunate, for the shot could not have been immediately fatal; it would have struck the animal in the middle. With the high log behind him, if he had been shot in the body at a distance of only a few feet, he might have



HE IS NOT SO BAD AS HE LOOKS

retaliated as many another cornered animal has done, and made things unpleasant for the young nimrod. As I arose hastily and picked up the gun, the bear scrambled over the log and disappeared.

One afternoon Jack La Pete returned to his camp at Whitefish Lake from Marquette after a night's absence. A little later in the day he came to our camp with a tale that a bear had raided his camp. On approaching his cabin he had seen a large hole in one side of it. Everything inside the door had been in confusion, pots, pans, and other utensils and articles scattered over the floor. The maple sugar and most of his salt pork had disappeared.

Since we had planned a hunt for deer up the slough that night, we took Jack back in our canoe, landing at dusk at the trail



THOUGH UNSCARRED, IT WAS A VICTIM OF GRAY WOLVES

This deer was found as it lay dead from exhaustion after it had escaped its pursuers by swimming the chilling waters of Whitefish Lake.

leading up to his camp. We lighted the lantern to show him the trail.

There was a commotion within the cabin, and as we approached out came the bear and took cover unharmed. None of us carried a gun. Examination showed everything again upset, packages destroyed and their contents eaten or scattered about.

Jack lighted his lantern and hung it outside to keep the bear away, and we left him and returned to the canoe. Paddling toward the head of the slough, we heard an animal breaking brush near the water's edge. We were certain the noise was not caused by a deer. The jacklight revealed the glow of a pair of dull bluish eyes.

As we went nearer, we made out the head and breast of a bear. My companion, who was in the bow, raised his gun and fired. As the smoke cleared away, we heard the animal crashing back through the brush. There was some blood on the bushes near where we landed, but we made no attempt to follow the trail, planning to take it up in the morning. We assumed that this was the marauder from Jack's cabin that had become thirsty after a feast on salt pork

and had come down to the slough for water. The next morning we found the bear dead across a log where he had perished, the victim of a sweet tooth and a fondness for pork.

Personally I have never seen in northern Michigan any evidence of the black bears' destructive habits excepting Jack's pilfered camp and an apple tree from which a bear had broken a large limb to get at the fruit. In the fall of 1929 the local papers in Marquette County mentioned recent instances in which bears had broken limbs from apple trees, and stockmen made bitter complaint to the State Conservation Commission, demanding that protection again be removed from the bears.

Black bears are among the least harmful of carnivores. Investigators of the Biological Survey have proved that only on rare occasions do they interfere with livestock. Their food is made up of miscellaneous wild plants, fruits, roots, mice, insects, and carrion. Fond of carrion, they promptly seek out carcasses of domestic animals, which they are often wrongly accused of killing.

CHAPTER XIV

Photographing Mink, Skunk, Weasel, Lynx, and Wildcat

THE increase, some years ago, in the value of furs lessened the numbers of minks in northern Michigan, but about the camp at Whitefish Lake, where there has been no systematic trapping, these furtive creatures may be seen as of old. If unmolested, they are often very bold like their relative, the weasel.

In my first attempts to get a daylight picture of one, I tied a dead fish-duck to the end of a string and fastened it several feet up a hemlock trunk just behind the house boat. Here minks were accustomed to pass along the edge of the water during daylight hours, although they were much more active at night.

A MINK SEIZES THE BAIT

An hour or so later I heard a slight noise, and, looking out of the rear window, saw a large mink hanging to the duck and swaying back and forth like a pendulum in its efforts to pull it down. I got the camera and tried for pictures, but so rapid was the movement of the animal that I obtained only a blurred image. In the shadows of the forest a slow exposure was necessary. I cut the duck loose and laid it on the ground. It was soon dragged out of sight.

Knowing that minks like fish, I placed some pickerel and perch along the shore. These were taken the first night. Consequently I set out a camera and flashlight, arranging the string in such a way that a slight pull on the fish would discharge the powder. So successful was this method that I soon obtained a number of pictures.

Weasels, skunks, and raccoons raided the poultry yard on several occasions and were indiscriminate in their tastes, but the minks confined their depredations to domestic ducks, often killing them in the daytime as they fed in the shallow waters of the stream. There one night I took a picture of one of these marauders (see page 274).

Our small flock of geese, however, was never molested by minks, except possibly on one occasion when I found the body of a half-grown mink on the bank with its skull crushed. It was at this spot that the geese assembled during midday to sun and

preen themselves, and it seems probable that the watchful gander had resented the approach of this little animal and had dealt promptly with it.

In the fall of 1911 I passed 10 days on my house boat on Whitefish Lake, and, as was my custom, placed some fish and the remains from the camp table a few yards back in the forest for the enticement of any wandering animal. The second night a visitor came, and the food it selected suggested that it was either a raccoon or a skunk. I promptly put up a light-colored plank for a background and hung the bait from it, so that the animal was sure to be in focus with its figure well outlined against the board, however dark its fur. At dusk I set the camera and flashlight within a dozen feet of the bait.

After dinner I sat on deck awaiting results, and about 8 o'clock the bright flame and heavy report of the flashlight startled me as it broke over the quiet, dark waters of the little bay. Whatever the animal, it had quietly disappeared before I went ashore with the lantern to reset the camera for another trial.

NORTHERN SKUNKS UNDER FLASHLIGHT

Several hours later the house boat again quivered from the shock of an explosion, but wishing before trying again to see what the developed plates would show the next day, I did not get up. The first exposure was that of an adult skunk pulling sideways at the bait. It was marked with the usual dorsal stripe and white-tipped black tail (see page 273). The second plate showed a skunk with a darker body and a tail almost entirely white (see page 272).

The following night it rained continuously, and no animal came, for skunks dislike wet grass and dripping bushes. On the third night three flashes were fired before 11 o'clock, and all the plates showed the skunk with the white-tipped tail. This one continued to come night after night and braved the terrors of the flash. Finally the white-tailed skunk summoned up courage for a second visit, and after that came regularly. Up to this time none of the photographs had shown the great plume-like tail of the skunk erected for action; but



HE PULLED AT THE BAIT HIS COMPANION HAD TOUCHED

This photograph and that on the opposite page were taken on the same night. Note the difference in the markings of the two skunks (see text, page 271).

the second skunk had evidently discovered that every time it pulled on the bait attached to the string there followed a dazzling light and a heavy explosion. Apparently not liking this kind of interruption, it always had its tail raised so that the battery concealed beneath it would be ready for instant use if the occasion required (see page 276).

Should one wish to compare the markings and the habitat surroundings of these skunks with those of the southern species, pictures of the Florida skunk will be found in the account of my experiences in that State.

SKUNKS EASILY PHOTOGRAPHED AT THE CABIN DOOR

Late one summer while I was taking night pictures of raccoons in the patch of corn adjoining my Michigan cabin, a developed negative unexpectedly showed a skunk pulling on a husked ear of corn that had been used as bait. Thereafter the raccoons disappeared, but whether because the supply of corn had about given out

or because the combined presence of skunks and the flashlight proved too much for their nerves, I could not tell.

The next afternoon, hearing a noise under the dark-room floor, I examined the outer wall where a drain pipe passed through, and found there a fresh tunnel in the sand. This indicated that a skunk had selected his winter quarters. That night a camera and flashlight apparatus faced the opening, while a string with a piece of bacon dangled from the wall.

At dinner every one jumped at the nearby explosion. A few minutes later while the negative was in the developer and the image of not one skunk but two began to appear, I could hear the animals moving about almost under my feet. Thus to take a picture of wild animals within three feet of the dark room and then to develop the plate in even closer proximity to the living forms represents an occurrence not likely soon to be repeated.

On leaving camp shortly after this, I gave orders to the caretaker to trap those undesirable tenants, and probably some



THIS WAS THE AUTHOR'S FIRST SKUNK PHOTOGRAPH

The animal shown here pulled a baited flashlight cord behind the house boat and a little later his relative (see opposite page) followed his lead (see text, page 271).

furrier soon afterward was busily engaged in converting their pelts into furs designated by some such high-sounding name as black fox or Alaska sable. Experiences at times taught the necessity of such summary disposal of animals usually unobjectionable except when claiming a joint tenancy in the abode of man.

SOME ADVENTURES WITH SKUNKS

On one occasion the dead bodies of 48 half-grown chickens that were being raised for camp use were found between two of the outbuildings, where they had gathered for the night. Each had its throat pierced by a single incision of sharp teeth, and scarcely a feather was ruffled. The killer seemed to have been satisfied with a few drops of blood sucked from the throat.

A trap set on the following night caught a half-grown skunk, whose beady little eyes and shrinking body made a picture of despair. But such wholesale murder forbade clemency. Sometimes for a short period after the hen ceases brooding them, young chickens from their habit of huddling together on the ground become easy victims of four-footed marauders.

Although the skunk will usually depart at the sight of man, it is often so set in its ways when traveling a narrow path that it will refuse to yield the right of way to a person coming from the opposite direction.

One evening many years ago, while hunting deer, I was returning to camp along a railroad track at a place where it crossed a broad swamp. The roadbed had been raised above the ground level by earth taken from both sides, so that the single track was hemmed in by broad ditches filled with water. Halfway across I saw a large skunk coming along the track toward me, and the idea of a head-on collision was not pleasant.

Shooing and shouting had no effect, and on he came. When within 20 feet he raised himself slightly to inspect me and I tried to put a rifle ball through his head—about the only shot that will paralyze the reflex action of the scent glands. The shot missed and failed to change his purpose to continue up the track. The next ball went through the body and was effective, but some minutes elapsed before I attempted to pick a way over the odoriferous spot he left.

Several seasons later, in the same local-



OUT OF THE DARKNESS CAME A DANGEROUS FELLOW

A rock bass, used as bait, coaxed ashore a mink that was swimming down Whitefish River (see text, page 271).

ity, I had another adventure with an even more spectacular ending. Behind a ridge of sand, out of sight of the railroad track, and at a place where a big fallen pine made a permanent backlog for the fire, was a favorite camping site. While there one night we heard a rattling of tin cans behind the tent. One of the guides, lighting a lantern, went to investigate.

We were somewhat surprised to hear him shout, "Come here, boys, if you want to see a new variety of canned goods."

Leaving the camp fire, we saw a large tomato can mysteriously coming toward us through the grass. A skunk had been investigating the interior of an empty can, and being unable to withdraw its head, was

trying to go home blindfolded.

Passing the side of the tent, he began climbing up the bank at the end of the backlog, but no sooner did he feel the bark beneath his feet than he turned down the log toward the fire, which was sending its ruddy flames many feet high. Our shouts failing to turn him back, we retreated as he approached the blaze.

Then came a puff of smoke from the singed and sizzling fur, and the poor animal toppled over into the coals below. As might be expected, his plight was accompanied by an odor that quite filled the atmosphere. Protected by the can from inhaling the flames, he managed to reach the tent. To put an end to such suffering and at the same time save a part of our outfit, one of us seized a rifle and dispatched him. The charred body was interred, can and all.

Except when defending itself against

a recognized aggressor or in a final death struggle, the skunk will seldom use its weapon, even though suffering great pain. Of the many dozen trapped about my Michigan cabin, none had signalized their capture by the slightest odor, even though they might pass hours or an entire night with a foot in the clutch of a steel trap.

A simple and effective method of safely killing these trapped animals was used at camp for many years. A five-foot chain connected the trap with a long pole, the latter acting as a drag, and when it became necessary to kill and remove a skunk from the trap, the pole was used to drag it safely down to the little bridge spanning the nearby creek. There, like a giant fishing rod,

the pole, chain, and trap were swung over the water and lowered, the weight of the trap sinking the animal beneath the surface. The carcass was removed a few minutes later. Never while the struggling animal was being dragged to the water did it discharge its fetid secretion.

Another method of practical value in permanently driving such animals away from one's camp or cabin without running the usual risk when shooting them was brought to my attention while I was camping south of Lake Superior in 1883. On this occasion a skunk was discovered busily eating our small supply of eggs in the provision tent. Shouting and shaking the canvas had but a momentary effect, for every few minutes the creature pulled another egg out of the box and ate it with a great relish. The colored cook was in a frenzy of indignation, favoring drastic action, but the rest of us felt that this might result in the loss of all the other supplies.

Just then our Indian guide, Dan, returned from the landing, where he had been cleaning trout. Without a moment's hesitation he went to the camp fire, scooped out a full dipper of boiling water, and approached the little tent with the evident purpose of scalding the trespasser. Still greater consternation seized us, for it seemed highly probable that not only the tent and its contents would be lost, but that the animal would soon be in our midst, anxious to retaliate with a fluid worse than that with which it was being assailed.

Seeing our fear, Dan said, "Don't be



THE TERROR OF THE CHICKEN COOP COMES INTO THE OPEN

Twice when weasels were seen near Whitefish River, a baited camera was set at night, and the little beasts took their own pictures.

scared; he won't even raise his tail when I swat him."

This Indian had been a trapper from boyhood. He was one of the most reliable of his kind and I had confidence in his knowledge of animal life. He was allowed to proceed. The instant the steaming water struck the skunk, the creature abjectly hurried from the tent and disappeared into the brush. The following day the same method was tried on another one feeding behind a log on bacon rind, and it immediately left without causing trouble.

The following season the colored cook was employed at a fishing club on Lake Superior, where he was greatly annoyed by a large number of skunks coming about the



A SKUNK MAKES READY FOR THE ENEMY

After it had been photographed for the first time, it would always have its tail up to be prepared to repel intruders that lurked near to make a loud noise when it tried to carry away the choice morsels lying about (see text, page 272).

kitchen after sundown. Recalling the successful dispersal of these creatures the year before, he devoted many evenings to pouring the contents of the camp kettle on them as they assembled below the porch at the garbage can, and in no instance did any of them offensively resent the scalding. Later he reported that occasionally bald-headed skunks were seen eyeing the cabin from a distance, but the kettle proved mightier than the garbage can.

That the skunk when suddenly injured and suspecting an unseen foe may sometimes fire a broadside in the hope of relief was shown by the following incident: Camping one stormy night in an abandoned cabin near a trout stream, we were astonished to see a fly rod, which was standing in the corner, drop to the floor and the reel buzz vigorously.

The owner of this particular rod, desiring

to save the fast-disappearing line, placed his foot on it. A moment later there arose through the wide cracks in the floor a terrible odor of the hooked victim, struggling a few feet below. This happened in the days when it was not considered unsportsmanlike to add an angleworm to the fly-hook. When the hook on the slack line slipped through the floor, the skunk undoubtedly regarded the suspended bait as a small but choice morsel. Cutting the line did not appease the animal, and until midnight most of us remained outside in a pouring rain waiting for the smoke of battle to clear away.

In another case of eviction the usual method of resentment had possibly a more subtle meaning. In clearing a lake near the camp of pickerel in order to replace them with black bass, we found the useful disposal of the captured fish a problem.



BEWARE, THE DANGER SIGNAL IS RAISED

The skunk carries its tail erect when suspicious of possible attack, but does not emit its vile smelling fluid from the two little tubes on the sides of the vent until it becomes alarmed for its safety (see text, page 274).

When it was suggested that one or two fish be put in each potato hill as a fertilizer, the idea seemed good.

On the following night every hill thus selected was pulled to pieces and the small potatoes scattered about. Skunk tracks told the story of the failure of our misdirected effort at conservation. In the evening a trap was placed near by with a fish hanging over it, and in the morning sunlight we found a big, fat skunk with both feet pinioned by the steel jaws. The usual baptism in the creek followed, and by way of warning and retribution the body was placed in another potato hill.

The next morning this hill had disappeared, while the body of the skunk was found caught sidewise in a hole beneath the cabin, showing an endeavor on the part of his comrades to carry him from the field of

death. In order to obtain additional evidence on this point, we placed the body in another potato hill. The camp cook remonstrated, remarking that at this rate we would be "sure skunked on a potato crop."

That evening a tugging was heard at the end of the cabin, and later the rubbing backs of the animals indicated that they were pulling the body well under the floor, and at the same time they were uttering a low chorus of whining notes. Soon we exchanged significant glances, for from below came the well-known scent, and in a few minutes the several rooms were wholly uninhabitable. We fled to a brush lean-to some yards away. An hour later we recalled that the four-foot cellar, loosely boarded up to keep the soil from caving in, contained all our perishable food. It was in the center of the danger zone.



A CONFIDENT VISITOR NEEDS NO DEFENSE

That this animal is unafraid is shown by its lowered banner. Skunks are mild and inoffensive animals if not disturbed or threatened.

Later we discovered that everything had become thoroughly impregnated. Lacking food and comfortable shelter, the next day the entire party sadly returned to town. Whether this proceeding on the part of the skunks was a wake, followed by a ceremonial salute over the grave, or was a premeditated attack upon the occupants above, must be left for the readers to determine.

THE CANADA LYNX

In all my years in the Lake Superior region the Canada lynx is the only member of the cat family I saw or heard of there. From boyhood down to the present time I have seen only one lynx within 10 miles of the southern shore of the lake. Lying along

the southern shore of Lake Superior is a narrow belt of land that receives an extra heavy snowfall. Not only is the snow deeper there than in the surrounding region, but it comes in a continual repetition of storms that keep the surface soft and fluffy, so that travel over it is difficult, even for a big-footed animal like the lynx. To the southward of this narrow belt and on the north side of the lake, where much less snow falls, lynxes are rather common.

In the account of my trips to the Wanapitei Lake country, in Ontario, the story is related of the taking of an unusual photograph of a fine lynx as it sat quietly on the shore of a small lake one night. A number of other lynxes were seen by day during those trips, but they were too shy to be photographed.

One day we saw a fine one sunning itself on a ledge projecting over the edge of Lake Wanapitei. It soon detected the approaching canoe and retired to brushy shelter near at hand. Once, while we were fishing for bass in a small lake, a large white-tailed doe came down the bank and walked along the sandy beach. A few moments later a lynx followed, apparently tracking it without any distinct idea of making an attack. The two traveled about 100 yards along the beach, keeping at the same distance apart; then the deer looked back.

The lynx stopped in its tracks, but the deer immediately turned and ran toward it, chasing its enemy up the bank and into the wooded cover. This happening showed that the deer recognized in the lynx an enemy, particularly of its young, but had

no fear of it in the open.

One morning in September, while I was on a high scaffold watching for migrating deer to cross the railroad track near Helena, I saw a large lynx coming down a deer runway that passed close beneath my stand. Waiting until the animal was almost beneath me, I leaned over and fired at its back, but missed. The bullet struck directly in front of it, throwing up the dirt into its face. The lynx immediately turned and ran back along the trail, and I fired another shot. The bullet again struck just in front of it, confusing it so completely that it turned again and ran at full speed several times around the base of the tree in which my stand was built while I continued to bombard it. Finally it dashed away into the forest, apparently without having located the source of the attack.

An occurrence in this locality a year later may have ended the career of this same animal. A shooting companion waiting for migrating deer was concealed at a point a few hundred yards south of the place where the adventure just described took place. At camp I heard a shot, which I assumed was fired at a deer. Soon afterward, glancing up the railroad track, I saw my companion approaching with a lynx.

Throwing the animal on the ground, he said, "I'll bet you cannot tell where it was hit." A careful examination of the body revealed no external wound except that several of the front teeth were missing. This led me to examine the back of its head, where I found a small bullet hole.



THESE ARE TYPES OF THE LARGE MICHIGAN SKUNK

Museum specimens of the northern skunk (*Mephitis hudsonica*) show variations in the white markings.

This had been concealed by the long hair which was smoothed over it. The hunter said he had been sitting concealed among some low bushes intently watching the railroad for deer when he had heard a slight sound immediately behind him. A quick glance over his shoulder had revealed a large lynx crouching only a few feet away, apparently about to spring upon him.

He had instantly swung partly around and fired point-blank at the animal's head, the bullet entering the slightly open mouth and killing the lynx instantly. Because the lower part of the hunter's body was hidden by the bushes among which he was seated, the lynx could have seen only his shoulders and the back of his head, and no doubt



THE MINK HAS KEEN POWERS OF SCENT

Wherever pieces of fish used as bait were placed, these animals promptly located them. The author believes that they have poor eyesight but exceedingly good olfactory nerves.

considered that what it saw was a part of a fawn or some other possible prey.

If my companion had not turned when he did, the lynx would probably have sprung upon him a moment later. That would have made a seemingly authentic case of an attack on man by a ferocious wild animal, yet it would have been, in fact, purely a case of mistaken identity.

WILDCAT DISPLACES LYNX

Though in the course of my early experiences in the forested region about Marquette, I noted the presence here and there of the Canada lynx. In all those years I never saw nor heard of the wildcat in the area. More recently, however, these animals appear to have come to the lake shore and have increased in numbers, while the Canada lynx, so intensively trapped for its valuable fur, has decreased. Concerning this, Vernon Bailey, the veteran field naturalist, has written:

"During March, 1907, while snowshoeing over much of the Huron Mountain country, in Marquette County, I found bobcat tracks rather common, and saw

three places where these cats were feeding on dead deer, probably killed by wolves, but possibly by the cats themselves. At a woodchopper's camp, between Huron Mountain and Big Bay, were three skins of very large bobcats trapped that winter near by. At that time the skins of these cats were of so little value that they scarcely repaid for the work of taking them.

"At that time Canada lynxes were very scarce there and none of their tracks were seen. Their beautiful light, fluffy fur had long been so valuable that intensive trapping had almost eliminated them from that region, which is one of the oldest fur-producing areas in North America."

The State Conservation Commission informs me that in 1928 its official trappers in northern Michigan captured 126 bobcats and 15 Canada lynxes, and that in 1929 the catch was 102 bobcats and 25 lynxes. The county clerk at Marquette reports that from January 1, 1929, until September, 1930, the county paid bounties on 151 bobcats and 13 lynxes. These figures give a good indication of the relative abundance of the two animals during recent years.

CHAPTER XV

Raccoons Invade Northern Michigan

DURING my early years along the south shore of Lake Superior the raccoon was unknown in all that region. The first record I have of its occurrence was made in 1892, when my uncle, W. R. Howe, on a deer hunt a mile west of Whitefish Lake, glimpsed a grayish animal and, thinking it was a wolf, shot at it through the undergrowth. He hastened to the spot and saw a raccoon jump down from the end of a log and disappear in the brush.

My first experience with this animal was recorded in a camp diary about 11 years later:

A RACCOON SUSPECTED

August 21, 1903.—Before I had eaten breakfast, Jim came from the barn with the announcement that all the young chickens had been killed in the night. The broods were more than half grown, and for weeks had been huddling at night in a narrow recess between two buildings.

Jim, noticing that they were not about the yard in the morning, had searched and found them all dead. Pulling out a few bodies with a rake, he had found that the throats had been cut by some predaceous animal.

I recalled that several years before a large number of young chickens had been killed by a half-grown skunk. Jim, however, said that a raccoon was responsible in the present case. The statement excited some derision on my part.

Jim's conclusion, it appeared, was not a matter of guesswork. The bodies of a number of the chickens had been torn open and the livers had been eaten—a raccoon trick, he averred. Furthermore the animal had entered the poultry yard by removing some heavy flat stones from beneath the wire fence, a thing that the fox, skunk, or weasel was incapable of doing.

The evidence proved conclusive when he pointed out in the moist ground around the water trough a miniature imprint that resembled the track of a bear or a child. It was a most interesting discovery, especially since we knew that the animal would likely return that night.

The damage having been done, I requested Jim not to set the steel trap, but to

leave some of the dead chickens outside the fence for the animal's entertainment. I would set out a flashlight on my return from a wolf-hunting trip to the house boat.

On the way up the river that afternoon I noticed the ripples caused by an animal swimming under the alders, and supposed it to be a muskrat until the gray body of a raccoon suddenly crossed a foot or two in front of the canoe. Although I had an opportunity to disable it with a blow from the hard-wood paddle, I let it go.

Returning to the house boat after dark without having had a shot at a wolf, although one had howled dismally in a dense covert not 50 yards from the canoe, we were surprised as well as gratified at seeing a raccoon sitting on the gangplank. We thereupon set up a couple of cameras with the flashlight a little above them and ran a string 10 feet to an eye screw at the base of a hemlock, with cheese and fish fastened to the end of the string.

While at work, I heard a slight movement in the dry leaves beyond and, turning the jacklight in that direction, saw only the two glowing eyes of the hungry visitor.

RACCOON EYES SHINE

While the eyes of all predaceous animals possess a wonderful luminosity when reflecting the rays of a light at night, those of the porcupine and other northern rodents do not glow at all. The eyes of rabbits and hares glow, but these animals are no longer classified as rodents.

After I had returned to the house boat and put out the light, only a few minutes elapsed before the brilliant glare of the exploding flashlight lighted the open windows. Quick as we were, the raccoon had disappeared.

August 22, 1903.—We went down the river to camp in order to develop last night's flashlight of the raccoon and found, according to the negative, that it preferred the cheese to the fish. The dead chickens left outside the fence at camp were undisturbed.

Taking a good supply of flashlight powder and plates, we returned in the evening to the lake. We decided to give the raccoon



THAT DANGLING BAIT MUST HAVE SEEMED LIKE MANNA

This raccoon took its own picture by pulling on a cord running between two trees where an attached string held the bait.

plenty of extra bait, with the hope that it might be induced to take a number of its own pictures in the course of the night. In this we were successful; the first flash was fired about 9 o'clock, another two hours later, and the third just before day-break.

Although the raccoon is cunning, it is not only very inquisitive but extremely daring when in search of a choice meal. Probably more than a million of these animals are trapped each year, but few are shot except at night with the aid of dogs. The raccoon is almost wholly nocturnal in habits. I have been on islands in the Gulf of Mexico that harbored many of them and yet, although they were not molested, I seldom saw one in the daytime.

The day before I departed on a camping trip to Canada, my guide and I endeavored to arrange for a final photograph that would be in striking contrast to all the others. A

thread 15 feet long was baited every half foot with cheese, and one end was suspended high in a maple tree. A fish duck, shot for the purpose, was made the goal at the end of the string. The result of this experiment is shown in this final picture (see page 285).

A month later I returned to camp, and as Jim came out to unharness the team, I asked him with some curiosity, "Is my raccoon still about?"

"Yes," replied Jim, much to my pleasure at first, "it is still here, and has two young ones."

"And they are not far away, either," he remarked after some hesitation, pointing toward the end of the barn, on which three pelts were drying in the sun.

About six years after the appearance of the pioneer raccoon, I saw a female with three young on the shore of the lake feeding on clams. The mother waded out in



THIS FELLOW CAME BACK FOR MORE

A piece of cheese hanging from a sapling near the house boat was a good lure. Nearly every night the location of the bait was changed so as to give a different view of the visitor.



AN UNEXPECTED CAMP NEIGHBOR WROUGHT HAVOC

On August 21, 1903, about 40 chickens were found dead. The following night the author's first raccoon photograph was taken back of the house boat (see text, page 281).



AN INVISIBLE BLACK THREAD HELD THE BAIT IN MIDAIR

The raccoon was equal to the occasion, however, rising on his hind feet like a kitten playing with a dangling string. It apparently was incurious about the source of the tidbit.



AN UNEXPECTED SUBJECT TOOK A BIRD'S APPOINTMENT

Trying for an owl flashlight, the author ran the line from a concealed camera to the end of a dead cedar, extending over the water. A raccoon scented the bait, a dead fish duck, with this result.



HE CLIMBED FOR A PRIZE

This was the last picture taken of a raccoon the first season they were seen.
The animal climbed 15 feet to reach the body of a duck.



APPETITE CAUSED THIS RACCOON TO BECOME A GYMNAST

One night a stake was set in the water with the bait on it so that the animal had to rise and lean forward on its hind legs to reach it.



A RACCOON FAMILY OFTEN FORAGED AT NIGHT

After they became established in northern Michigan, these animals were frequent visitors to flashlight cameras set near the house boat along the shore of Whitefish Lake.



A PIECE OF CHEESE ON TOP OF A MOSSY LOG TEMPTED HIM

This wary raccoon did not suspect that he would pull a flashlight cord in his effort to satisfy his craving for the dainty. He looks resentful, like an urchin caught in the cookie jar.



A RACCOON FIRES A FLASHLIGHT

Many years ago this omnivorous animal was unknown on Lake Superior, but on the coming of the second growth clearings and farming settlements it has taken up a permanent abode there.

shallow water, and felt about on the bottom with her handlike front feet. On finding a clam, she carried it ashore to share it with her offspring.

Satisfied that these animals would regularly patrol the lake shore, I put out a varied assortment of bait behind the house boat. Since raccoons are omnivorous, I knew they would welcome any scraps from the table. In a few days the bait was taken, and I set out a flashlight. That night it was fired, and the developed plate showed a big, fat raccoon, apparently yet another stranger.

As the raccoons increased in numbers about Whitefish Lake, they could not depend upon the uncertain contributions from the house boat, for often the cupboard was bare. When the corn patch had reached the roasting-ear stage, the raccoons soon discovered our little field and came night after night, undeterred by the booming flashlight.

The raccoon is mentally alert, and a great traveler by night as the pigmy, manlike tracks left by its hind feet prove. The creatures inhabit dens under the upturned roots of fallen trees or even burrows made by themselves in banks in places where other shelter is not convenient, but, above all other kinds of homes, they appear to enjoy hollows in living trees or in dead stubs.

The raccoon is mainly an inhabitant of deciduous forests in the temperate and tropical zones, especially of such tracts as contain abandoned clearings, swamps, ponds, watercourses, and open glades, which provide an infinite variety of wild fruits and berries, the eggs and young of nesting birds, frogs, mussels, and the crayfishes of wet lands. Although it is forced to hibernate in its more northerly range, it greatly prefers a climate where it can indulge in nightly rambles throughout the



THIS NIGHT PICTURE WAS TAKEN AT THE EDGE OF A SWAMP

Note the handlike paw of the raccoon. The sole of the hind foot is naked and plantigrade like that of man. When young, these animals make interesting but inquisitive pets.

year to gratify a most omnivorous and endless appetite.

Like its relative, the black bear, it can live for a long period on a single item of diet, but it is always willing, when opportunity affords, to partake of about every variety of natural and artificial food that Nature or man may offer it. In fact, the only things it will not eat are the only things

a porcupine will eat, namely, bark, leaves, and water plants.

For a long time raccoon fur had little value in the market, but in recent years it has so increased in price that these animals are being relentlessly pursued. Although very prolific, they may become dangerously reduced or even exterminated unless they are well protected by a closed season.

CHAPTER XVI

Photographing Muskrats About Whitefish Lake

THE muskrat is peculiar to North America, on which continent it now occupies suitable places from the Atlantic to the Pacific and from the deltas of the Colorado and the Mississippi rivers north to beyond the limit of trees on the Arctic tundras. The remains of muskrats have been found in Pleistocene deposits in many parts of the United States, but no trace of them has been found in the Old World. They have been introduced into Bohemia, however, and have become pests.

Like the beaver, the muskrat belongs to the order of rodents, and in the time of Linnaeus these two animals were placed temporarily in the same genus undoubtedly because of many resemblances in physical characters and habits. This general resemblance lies in their heavy coat of fine waterproof underfur overlaid by long, coarse, guard hairs, the general form of the body, the adaptation of the hind feet for swimming, and the naked scaly tail. The shapes of the hind feet and of the tail, however, are quite different in the two animals.

BEAVERS AND MUSKRATS SIMILAR

This general similarity extends also to their habits, for both animals are aquatic, nocturnal, and monogamous, and both often live in conical houses that they build on the shores of lakes or streams or in marshes, or in holes dug in banks. In food habits, however, there is more differentiation, the beaver taking a large part of its sustenance from the bark and twigs of trees and bushes that it cuts for the purpose, whereas the muskrat depends mainly on the roots and stems of aquatic plants, although the branches of shrubs are sometimes eaten.

The reason given for demoting the muskrat as a former associate of the beaver and placing it in a group of rodents comprising a host of rats and mice was that this heretofore humble fur bearer was supposed to resemble closely the little meadow-mouse (*genus microtus*) widely distributed throughout the world. Many field naturalists now believe that the muskrat more closely resembles its aquatic comrade, the beaver, both structurally and in habits than it resembles the terrestrial meadow-mouse, a subject more fully referred to later.

The name "muskrat," based on the possession of scent glands and a generalized similarity in size, form, and color to the well-known house rat, has had the effect of lowering these animals in the public estimation, and for many years the creature was more or less of an outcast among fur bearers. The skins brought so little in the market that they did not pay for the labor of taking them, and at times the fur traders of the north refused to buy them at any price.

THE CINDERELLA AMONG FUR BEARERS

In recent years, however, the really handsome and durable fur of the muskrat has become appreciated both in its natural colors and in a number of dyed forms under high-sounding trade names. In 1920, at the crest of high prices for furs, muskrat skins brought in fur auctions the maximum of \$7.50 each. Today they still command prices that in their total annual returns render this animal, whose silky coat was once held in contempt, the leading fur bearer of the continent.

The increased value of its skin has led to such wholesale trapping that the animal has almost disappeared from many of its former haunts, and its future is threatened wherever the species is not carefully safeguarded. The States are now giving it increased protection under the law; and great areas of marshlands are being held and carefully administered by their owners as muskrat farms.

The interest in this phase of fur farming has grown rapidly during the last few years, since it has become more generally appreciated that a marsh area of little value for other purposes can be made a good income producer as a muskrat farm. The greatest marsh area held under single ownership for muskrat production is located in southwestern Louisiana. It contains more than 1,000,000 acres.

In August, 1929, about 450 licenses to conduct muskrat farms were in force in Michigan. The number of licenses gives some idea of the interest aroused in this animal as a fur producer, although probably only a minor proportion of the license



THE MUSKRAT BECAME BOLD ENOUGH TO APPROACH IN DAYLIGHT

The carrots and other attractive food in the camp garden and lack of molestation caused a number of these animals to frequent the waterfront there and even to venture to parts of the garden by day. This picture was taken under the boathouse.

holders in the State were really producing muskrats.

Every one who visits suitable waters and marsh areas is familiar with the figure of the muskrat. Toward evening it may often be seen swimming near shore, or sometimes waddling along the banks or on partly sunken logs. At places frequented by muskrats along shore sometimes spots littered with empty clam shells mark the spots where they have eaten almost the only flesh sought by them.

Muskrats may be less abundant in wilderness areas than in the marshes of a partly settled district, where the mink and other enemies have been mainly eliminated, and where the farmer boy, rather than the professional trapper, has been their only enemy. The relative abundance and value of the pelts make it now well worth the

effort of the skillful trapper to visit the marshes bordering civilization as well as those in remote places.

Being largely nocturnal or making its appearance toward dusk, and then usually in the water, the muskrat is not an easy animal to photograph in the daytime. In the summer of 1910 I decided that animals that were so abundant and that had heretofore refused to pose for pictures must be sought systematically.

PHOTOGRAPHING MUSKRATS

Naturally the obtaining of night pictures with the aid of a baited string was the plan in mind, and the only question of importance was the kind of bait likely to coax the animals out of the water and into a place where the camera could be set and easily examined. As an experiment, I



HEADED FOR THE CARROT PATCH, IT HURRIES

Musk rats swim high in the water when not alarmed, in contrast to the heavy bodied beaver, which usually shows only the upper part of its head.



NO TIME TO BOTHER WITH ANYTHING BUT FOOD

This daylight picture shows a muskrat sitting on the edge of slightly flooded new ice, feeding on small plants brought up from the bottom of the lake.



THE MUSKRAT CAME OFTEN TO HIS FAVORITE RESORT

Carrot or celery bait on a log always gave good results, for the keen sense of smell of the animals quickly led them to the baited string (see text, page 294).



THERE WAS A MUSKRAT CAFETERIA NEAR CAMP

Although primarily a vegetarian, this little fur bearer enjoys an evening feast on clams. It gathers them from the bottom of the water and carries them ashore, where it eats them at leisure on a sloping bank or other bare place.



THE GLUTTON CAME TO A SAD END

This carrot addict was found one morning lying dead near the same spot, apparently a victim of an uncontrolled appetite (see text, page 295).



A GLUTTONOUS MUSKRAT OVERATE

The animal pictured above took possession of the carrot patch at camp and gorged on the vegetable by day and by night. One day it was encountered in the garden and halted by the broom shown in the print until its photograph was taken (see text, page 295).



TREASURE TROVE IS NOT ALWAYS WHAT IT SEEMS

A muskrat found a delicious carrot hanging over his favorite log. When he took it in his paws to begin a feast, a loud explosion occurred and he dived into the water for safety but left his portrait.

put celery on the logs near the runways, or close to the entrance of their summer homes, on the banks of a stream and marsh near camp. The following morning the celery had disappeared.

I then had four stakes driven in the water opposite a log from which the bait had been taken, and a board placed on top for the support of the camera. Another and heavier stake behind held the flashlight apparatus, and from it ran a string to and through an eye-screw set in an overhanging branch, with a piece of celery attached to the hanging end.

That night the powder exploded, and the developed plate showed a chunky muskrat reaching up for the bait. Every night

thereafter the muskrats came, regardless of weather, and a good set of pictures resulted.

Two seasons later I took additional muskrat pictures, but mostly for the purpose of showing their recently constructed winter homes. Instead of celery, I used as bait carrots taken from a large bed in front of the cabin. Thereafter every muskrat in the vicinity became reckless with delight over this luscious food, and long before dark the flash would be prematurely fired, making it necessary to set it again after nightfall. Sometimes the canoe would not get more than fifty feet away from the camera before the explosion came, showing that the expectant animals were watching near at hand.

After many pictures had been taken, the camera and flash were set out for rabbits in a little swamp near the stream, and I

wondered what the muskrats would do. The first flashlight picture taken there showed a muskrat in place of a rabbit, indicating that the keen nose of this animal had located the carrot in a new locality fifty yards away.

DID THIS MUSKRAT DIE FROM OVEREATING?

A few days later in bright sunlight a particularly large muskrat was seen leaving the stream and waddling up the trail toward the carrot patch in the camp garden, where it proceeded to pull up a carrot. With its prize it returned to the water.

Considering this a good opportunity for a daylight picture, I went to the cabin for the camera and, returning, seated myself

within a few yards of the trail, having first placed a carrot temptingly in the way. After waiting a while without seeing any animal, I went to the carrot patch and found that the visitor had returned while I was after the camera and was busily at work.

The guide seized a broom to drive the animal out into an open space where it could be photographed to better advantage, a proceeding it resented with some vigor by biting off the ends of the wisp (see page 293). By our efforts to round him up, he was upset, and we saw that he had become so fat and unwieldy that it took several trials before he could regain his footing. When right side up, he was seized by the tail with a gloved hand and held aloft while the camera snapped again.

Replaced on the ground he headed for the water, but on discovering the carrot in the trail, he seized it without any sign of fear, dragged it down to the water's edge, and disappeared with it under the dock. Late in the afternoon I set the flashlight on the path near the water and at dusk, just as the bait was being tied on, I saw the dim figure of the muskrat coming out of the creek headed for the carrot. With a warning cry, we rushed away just as the flash exploded.

For many days thereafter this animal ate and dozed alternately in the carrot bed, and one evening I saw him at the edge of the bank with a large carrot. He would take a bite, close his eyes for a few moments, and then nibble again. He had now grown fatter than a woodchuck. Next morn-



MUSKRATS HAD A SECOND-FLOOR APARTMENT AT WHITEFISH

The hollow log lying with its open end half submerged in the shallow water had a large knot hole on its upper side. The animals built their nest directly over this hole, thus obtaining a well-concealed entrance.

ing I saw the animal's head projecting from under the dock. For the first time he did not appear to be interested in carrots. Examination showed him to be as "dead as a mackerel."

That excessive fondness for carrots and a disposition to overeat was fraught with danger to muskrats was again made evident the following year. Having discovered an ample supply of these vegetables in the camp garden, muskrats came there at night, and occasionally in the daytime, thus threatening the root-house supply.

A big fellow was found one day in a torpid condition not unlike that of the muskrat of the previous year. On being prodded, he would move only a few yards

and then relapse. When he neared the bank, I pushed him over and he rolled to the bottom and expired.

Several days later another muskrat was found dead in the carrot patch. These occurrences seemed to indicate that the supposedly harmless vegetable contained a toxic element producing fatal results when eaten continually by these water-loving rodents. I regret that none of the bodies was sent to a laboratory for investigation.

Early one November, before ice formed on the stream, I procured a final flashlight picture of a muskrat climbing his snow-covered house for a farewell bite at a carrot, the welcome odor of which had penetrated his cozy home (see page 298).

MOTHER MUSKRAT CHASES A MINK

Once, while watching for deer from a tree overhanging the water, I saw five young muskrats sunning themselves on a near-by log, while the mother swam about in a watchful way. Suddenly she gave a squeak and flapped her tail, whereupon the youngsters tumbled off into the water and, diving, disappeared in the hollow end of the log, followed by the parent.

Looking about for the cause of alarm, I saw a good-sized mink peering through the brush at the place where the inner end of the log was embedded in the bank. Apparently satisfied that the only chance for an immediate meal lay in submarine operations, and possibly not knowing that a protector was at home, the mink glided into the water, and without a moment's hesitation, dived out of sight at the entrance to the log.

I was much surprised a few moments later to see the mink shoot to the surface and make hastily for the shore, with the mother muskrat in angry pursuit. On landing, the mink ran into an opening in the trunk of the tree upon which I sat. The muskrat followed, but no encounter occurred. The mink came out the other side and with a quick dash reentered the first hole. Several times this maneuver was repeated, the muskrat becoming more and more infuriated. Finally, the mink ran up the bank, while its antagonist, taking no chances of being lured away, sat watchfully on the shore for half an hour.

The following week I saw three young muskrats on the log, and this reduction in number doubtless meant a successful raid by the mink later when the mother was

out of sight in search of food. It is certain that the powerful incisors of an adult muskrat constitute no mean weapon against another animal the size of the mink.

The muskrat, possibly because of its small size, is much more given to variation in the location and character of its homes than the beaver. At times it may take possession of the overhanging lower part of a beaver house, to which it makes a submerged entrance, and builds a snug retreat within. Apparently tenant and landlord live amicably as close neighbors.

Muskrats also make burrows in different sorts of locations in banks, including embankments at the ends of old mill dams in which all-the-year homes are often maintained. The tunnels lead back about 10 to 15 feet to a cavity at the end containing a warm nest, in which the young are born. Nearly always when these burrows are made in banks, the entrance originally is under water, but as the surface of the water falls sometimes they are left partly or entirely exposed. As the water recedes, the animals often try to preserve their water entrance by deepening the little canal.

In spring or summer, if rising waters flood out the conical houses, or even the tunnel homes, muskrats gather a pile of branches, roots, and leaves on the bank to shelter the young temporarily until the falling water enables the mother to provide a safer home to guard against enemies.

MUSKRATS BUILD TEMPORARY HOMES

Hollow logs, lying along the banks of small lakes or streams in such a position that one end is nearly or quite submerged, are favorite resorts. If a solid log lies in a similar position, the animals often tunnel underneath it, below the water level, extending the passageway up into dry ground on the bank in which the nest is made, well protected by the log above. This type of home is, I believe, rather common.

Sometimes a hollow log on the bank with one end submerged is used as the basis for a conical nest on shore. In one instance I noted of this kind the outer entrance through the submerged end of the log led to a hole in the top of the log that opened into the middle of the nest resting above so that no outer doorway was required.

During the autumn months, old and young muskrats, lacking a warm home within reach of open or running water, must provide one in advance of the north-



TWO MUSKRATS COMPLETE THE SECOND-FLOOR APARTMENT (SEE PAGE 295)

ern winter. About Whitefish Lake most of these animals appeared to have quarters habitable throughout the year, but about 10 per cent of them built the usual dome of reeds and other water plants in the marshes at the inlet or the outlet of the lake, where the running water prevented ice from forming to the bottom.

After the surface of Whitefish Lake has frozen over, some of the muskrats make holes through the ice, over which they build small houses out of a mosslike water plant. These they use as temporary feeding and resting places while gathering food away from their homes on shore. Although the type of house-building material used by the muskrat and the beaver usually differs, yet under the pressure of necessity each may utilize that of the other. In prairie country, where trees are scarce, the beaver is known to build its lodge entirely of aquatic vegetation. Where water plants are scarce, muskrats may build with sticks, leaf mould, and litter.

One fall at Whitefish Lake I found a small cedar raft. It lay with one end lodged on the shore and the other projecting into deep water. On the outer end of the raft muskrats had built a house of the usual wet vegetation. The mass was added to until its weight sank that end of the raft and drowned out the occupants.

This odd location for a muskrat house interested me, and I decided to build a much larger raft. The new raft was completed in August and anchored at one end in open water about eight feet deep off a reed-grown marsh.

Visiting the raft only a few days after it was anchored, I was surprised to see that the base of a large "house" had already been laid near the stern. Within 10 days the house was completed. It was five or six feet across at the bottom and more than three feet high. The entrance was a hole leading from the water up through overhanging vegetation.



NO DANGER HERE FROM WOLF, FOX, OR LYNX

This raft, built and anchored in about ten feet of water, swung freely with the wind. As an experiment the author made a hole in the middle of it. The muskrats at once sensed its advantage as a doorway. Their domicile was built directly over the opening and had no overhang.



FIRST COME, FIRST SERVED

The pulling string leading to the flashlight camera was baited with a carrot and a fish to catch either a muskrat or a mink. The first comer was a muskrat; but the fish was gone, and tracks in the snow proved that a mink also had visited the place.



CONVENTIONAL ARCHITECTURE IDENTIFIES THE BUILDERS

This is the usual conical muskrat house to be seen in marshy places throughout most of the northern United States and Canada. The picture illustrates a marshy part of the slough at Whitefish Lake, which was a notable resort for deer.



MUSKRATS BUILD LIKE BEAVERS

This night picture shows two householders at the bait that fired the flashlight. Their shore houses have a striking resemblance to those of their larger relatives in similar locations except that the latter are larger and of coarser material.



MUSKRATS LIKE HOUSE BOATS

A cedar raft anchored offshore at the north end of Whitefish Lake was promptly occupied by these animals, which proceeded to build a substantial winter home upon it of mosslike small vegetation from the bottom of the boat. The edge of the "house" projected over the side of the raft, thus sheltering the entrance. The abode was occupied at least four successive years.



MUSKRATS BEGIN A DOUBLE APARTMENT ON A HOUSE BOAT

After they had started constructing their house near one end of this raft, a small empty box was placed at the other end to serve as a support for a flashlight camera that would photograph them at work in the night. The next morning the camera was found entirely covered by a part of the debris the animals had piled over it and one side of the box (see text, page 301).

At Whitefish Lake muskrats generally do not construct their winter houses until about the first of October after fluctuations of the lake due to September rains.

The raft provided a previously unknown type of foundation for a muskrat house in this locality; and such prompt utilization of it in advance of the usual house-building season seemed to me to be a good example of the reasoning powers of animals. This house was occupied throughout the following winter and for about a month later than usual in spring, when seasonal floods drowned out ordinary winter habitations.

I built next a raft with a hole about a foot long and six inches wide a little back of the middle. This would provide a better entrance to the nest than that to last year's house through the overhang. The raft was anchored about 75 yards from the first raft, which was still in use. The muskrats took possession promptly and appeared to appreciate the convenience of the hole for an entrance. The house was erected directly over it, and no overhang was built (see page 298, upper).

The next season I placed at the upper end of the raft a large box, open at one side, to support two cameras. A stake was fastened behind for the flashlight, which was connected by a cord with the foundation of the house toward the stern.

MUSKRATS TAKE POSSESSION

No sound of the explosion of the flashlight powder being heard for a couple of nights, I visited the raft. The muskrats seemed to have believed that the box with the camera had been placed on the raft for their benefit, for they had at once abandoned the house they had begun at the stern, and going forward had completely covered the box and cameras with a mass of house-building vegetation.

These rafts, anchored at one end only, swung about freely with the changing wind. The muskrats built their houses on the after third of the structure, evidently in order to be better sheltered from the spray coming over the bow when the wind was fresh.

In the more southerly parts of their range muskrats are believed to have from three to five or more litters a year. The number of young in a litter varies from three to about ten. I am inclined to believe that only one litter a year is born in the northern part of their range. In the region with which I am familiar along the

southern side of Lake Superior I have seen no evidence of more than this. The young muskrats are born late in spring or early in summer, and commonly first appear with their parents about the middle of July.

DECREASE OF MUSKRATS AT WHITEFISH LAKE

From 1875 to 1924 the number of muskrats about Whitefish Lake and adjacent streams appeared to average about 100, the population being so uniform from year to year that it was evident the young must migrate as they became old enough. Some seasons in the course of this long period they were trapped by Jake Brown without any apparent effect on the number there the following season.

In the summer of 1924 I saw only two muskrats. That fall no houses were built by these animals at either end of the lake, and only a very few along the adjacent streams. I put out carrots on logs and rocks in the water. Formerly these would have been eaten before dusk, but now they remained untouched for days.

For two years this scarcity continued, but in the summer and fall of 1927 muskrats began to appear again and built several houses. The sudden disappearance of muskrats at this locality was not due to overtrapping, and no change in the supply of aquatic food plants was noted.

The outbreak of some deadly disease among them seemed the answer to the problem although, I must confess, no definite evidence of this was found.

In recent years the flesh of the muskrat is becoming more and more esteemed. Its unfortunate surname—"rat"—has excited a prejudice against its use for food. The meat is dark red, fine-grained, and tender. The Biological Survey says any unfavorable opinion concerning its flavor probably arises from lack of skill in cooking or from carelessness in skinning the animal. It can be fried, roasted, or stewed. Its slightly gamey flavor can be removed by soaking the meat overnight in salt water.

For years it has been served, highly seasoned and flavored, under the name of "Maryland terrapin," without exciting any suspicion on the part of connoisseurs, who pay a fancy price for it. The appearance of a few terrapin bones in the dish when served may have helped in this deception. In some of the cities of the Eastern States the carcass brings from



HOW A MUSKRAT BUILDS A WINTER HOME

30 to 40 cents, several times the price once paid for its pelt.

Now seems an appropriate time to suggest that the muskrat should be restored to a place in the genus represented by the beaver. It is worthy of note that the scientific name of the beaver is based upon the presence of two sacs near the anus known as castors. These secrete a bitter substance having a very penetrating odor. The 'muskrat' gets its common cognomen from perineal glands secreting a pronounced musky odor. Therefore, each of these two semi-aquatic rodents is associated in name with glandular secretions.

If the muskrat could now be called by its Indian name 'musquash' it would be at once relieved of its offensive terminal 'rat' and given proper standing among the more valuable fur bearers.

When it is appreciated that the beaver and the muskrat are the only members of the rodent family that are monogamous, and that they are the only two rodents that possess a valuable underfur important commercially, it seems the proper thing to have the two associated in the same group. In this re-arrangement the latter should be accorded the greater distinction because it is indigenous to North America.

CHAPTER XVII

Beavers About Whitefish Lake

THE beaver is well known in North America. It is not generally known, however, that it exists also in some of the northern regions of the Old World.

Fossil remains of beavers associated with those of the mastodon and the mammoth of the Pleistocene Period, in the northern parts of America and of the Old World, show us that this animal has come down from ancient days. Some extinct relatives of the animals we know were huge beasts, literally giants of their kind.

In the Old World the beaver has gone from most of its former territory, but in North America is still found in much of its original range, from the mouths of the Rio Grande and Colorado Rivers to the limit of trees in the North.

BEAVERS APPEAR IN FOLKLORE

In view of the early importance of this animal as a source of food and fur to the Indians, its skill and resourcefulness in building houses and dams and storing food for winter, and its wariness in avoiding the wiles of the trapper, there is nothing strange in the fact that it figured prominently in the folklore and ceremonies of many tribes. Its abundance and the value of its fur had an important bearing on the early exploration and occupation of this continent.

It is an aquatic and mainly nocturnal animal, living with a single mate and young in a domed house built along shore, or in a burrow dug in the bank of lake or stream. The entrance to such a house is below the surface of the water, a tunnel leading up from it to the dry nest chamber.

Like the muskrat, the beaver has a waterproof coat of fine, silky underfur overlaid by long, coarse guard hairs. Castoreum, a substance with a strong musky odor, is secreted by two large glands. This was long in demand as a basis for medicines and perfumes. Beavers are compactly built, powerful animals for their size, as is indicated by some of their workings. In September, 1930, while the Michigan Conservation Commission was capturing beavers for restocking purposes, one was taken that weighed 73 pounds.

Many persons are under the impression that the beaver feeds more or less exclusively on the bark of trees, and that it eats soft vegetation only incidentally. This is not the case, for in its extended range the beaver depends upon bark mainly during the late fall and winter months when other food cannot be obtained.

At the time of my earlier visits to the south shore of Lake Superior beavers were abundant on the lakes and streams back from the short drainage slopes leading into this big lake, but were seldom seen in the daytime, although their fresh cuttings, slides, lodges, and dams indicated their wide distribution. After 1885 their decrease in numbers became very noticeable, and between 1890 and 1900 I saw only two, each living a hermit life in a river bank, neither apparently daring to build a lodge or even to provide an adequate supply of bark for winter in the pools close to its entrance tunnels.

Such was the situation when the Legislature passed a belated act closing the beaver season for a number of years. Gradually a recovery was noted, and odd as it may at first appear most of the new homes were located close to farmhouses or not far from well-used highways. In such places the professional trapper had no line of traps. He feared to poach, knowing the popular interest then aroused in an animal that was almost unknown to the later generation of settlers.

CONDITIONS IMPROVED FOR BEAVERS

Today the Upper Peninsula of Michigan, like many other parts of the northern country, contains more beaver food and a larger area suitable for their habitations than in the days of the primeval forest before the white man came. Originally nearly every stream, pond, and lake was fringed with a heavy growth of coniferous trees, none of which had bark palatable to the beavers. In such regions it took the animal countless years to flood out and destroy areas in such forests.

Once an opening was made, in due time came meadows with plants, succulent roots, and a variety of edible hardwoods. After the advent of the lumberman, however, mil-



BEAVER BUILDING ENTAILS TIRELESS LABOR

Later this peak of massed sticks and poles was heavily plastered with mud. The branches in the foreground are the projecting parts of the winter food supply which fills the water below to a depth of five feet.

lions of acres of pine, hemlock, and cedar went down before the ax, and forest fires usually completed the destruction. The succeeding second growth consisted mostly of poplar, cherry, black ash, birch, and willow, all of small diameter except the ash and massed near the watercourses. It is in this region of second-growth timber, where the commercial value of the trees is least important, that the beaver now seeks to establish its home.

AUTUMN FLASHLIGHTS OF BEAVERS

In October, 1912, I heard that a large beaver dam had been constructed during the summer about 30 miles northwest of Marquette. The lodge was approaching completion, and because I realized its future occupancy was likely to be of short duration, it seemed desirable to me that the camera should take photographically what the steel trap would take physically within 90 days.

On the afternoon of October 11 I set up a small tent in a grove of poplars, in which many white and tooth-scored trunks gave evidence of the recent work of the beavers. The dam had been completed months before, the lodge was about ready for use, and the animals were occupied in their final labor of storing away in the deeper waters

near their home an ample winter supply of poplar and birch.

My plan of operations, decided upon in advance, combined two distinct methods of getting a picture, but it was impossible to carry on both on the same night. My plan meant camping for two days in the valley.

My first scheme was to set up the cameras and flashlight apparatus opposite the lodge, with the expectation that when a beaver climbed out of the water to plaster mud on the side of its house, the string placed at the edge of the water would be touched and the flash fired. The plan for the succeeding night was to make a small breach in the dam so that when the old beavers discovered by the receding water that repairs were needed at some point in the reservoir walls, the one attempting this work would come in contact with the string and furnish the second picture.

The first night my guide and I were in our sleeping bags at dusk, for a heavy frost was threatening, and no blazing fire was permitted in this locality. An hour later we heard the flap of a beaver's tail down by the lodge and this sound was heard frequently thereafter, indicating that a trace of scent or the dark green camera boxes were exciting alarm.



THE FIRST FLASHLIGHT PHOTOGRAPH OF A BEAVER CUTTING DOWN A TREE

For two weeks the camera faced this partly cut black ash without result. Then one night the animal came and left his picture as he began his night's task. The flash and report must have frightened him badly, for he never renewed work here and left the damaged trunk as a monument to the fact that only one of his kind works on a job.



BEAVERS MAKE EXCELLENT CANALS (SEE TEXT, PAGE 317)

The author found two near Marquette in 1929. One led from Harkins pond through a grassy flat for about 75 yards to a group of poplars. It was about three feet wide and eighteen inches deep.

No welcome explosion occurred during the night, and in the morning I found that the animals had devoted the time to towing in an additional supply of branches for food. Whether the house was completed or work on it had been suspended for a while, I could not tell.

Not a beaver was seen in the earlier part of the day, but late in the afternoon a pair of muskrats was observed near the edge of the overflowed meadow busily engaged in erecting their smaller home. They showed a deep appreciation of the slack water afforded by the dam their larger kin had built. Before dark, because of the break I had made in the dam, the water level had fallen six inches. This ebbing, I felt sure, would

be sufficient notice to the watchful beavers that repairs were needed.

Across the break in the dam I placed a birch branch, tying the flashlight string to it, with the idea that the beavers, after an inspection of the damaged part, would pull the branch aside as they began the repairs, and thus fire the flash.

It was not until after midnight that I saw a faint flutter of light on the white canvas roof. Almost immediately I heard the boom of the flashlight. I found next morning that a beaver had cut the birch branch in two, and while pushing one piece aside discharged the flash. The failure discouraged further efforts, and the beaver retired to its wigwam, perhaps to report an



BEAVERS EAT POPLAR BARK FROM A LOG PROVIDED BY THE AUTHOR

The appearance of more than one of these animals in a flashlight picture occurred only once in the large number taken. These subjects are parent and young.



HE FELLED A TREE UNDER DIFFICULTIES

Usually a beaver makes his cutting from 18 to 25 inches from the ground on which he is standing, but in this instance a tree was chosen that required that the worker mount a log to complete his work.



BEAVERS BUILT A HUGE DAM FORTY-FIVE MILES WEST OF MARQUETTE

This particular structure, 300 feet long, five feet high, and four feet thick at the base, extended in broken curves across the valley. It was composed of brush and mud, with an unusually large number of heavy stones along the rim. In July, 1912, 35 feet of the dam were blown up by dynamite by men wishing to harvest a hay crop in the meadow above. In less than five days the beavers had completely rebuilt the dam.



A BEAVER PLASTERS HIS HOUSE AT NIGHT

Each fall these animals renew the covering on their dwellings as protection not only against the weather but also against their enemies. The frozen mud makes an effective cement. While loitering about a beaver lodge at night, the author has heard from within whimpering sounds which he attributed to young beavers making their wants known to their parents.



THIS WAS THE FIRST BEAVER TO TAKE ITS OWN PICTURE AT NIGHT

About midnight, the night after the author had made a break in the dam, one of the animal engineers came to learn the cause of the fall in the water level in the pond. He pressed the flashlight cord and photographed himself.



A FALLEN BLACK ASH SHOWS BEAVER WORK

The top and limbs have been cut and towed away and the bark on the upper part of the trunk has been eaten. This was the only tree observed by the author that was felled into the water; others had been dropped on land.



HE WORKED ON THE BASE OF A DAM THREE FEET UNDER WATER

This is one of many beavers that for years tried to fill the sluiceway of the old lumber dam above Whitefish Lake Camp. The flashlight was fired by hand when the animal was submerged about three feet. The glossy hairs on its back took white by reflected light.



IT IS TOWING A SAPLING IN FOR THE WINTER STORES

The beaver ordinarily swims with its body entirely submerged. At a distance it is often difficult, day or night, to distinguish a beaver's head in the water from the body of a swimming muskrat except by the size of the wake.



A BEAVER EYED THE CAMERA SUSPICIOUSLY

As the flashlight exploded, he was beginning his preliminary girdle on the tree trunk of a giant black ash, all the smaller trees having been cut down.

extraordinary condition of affairs both at the dam and on shore.

After getting this picture, I returned to Marquette to meet Colonel Roosevelt, who was to deliver an address there that afternoon. When the train backed up to the station, where thousands of persons had assembled, Roosevelt stood on the rear platform.

THEODORE ROOSEVELT INTERESTED

He knew of my quest and as soon as he spied me in the crowd he shouted in tones to be heard above the din, "Did you get a beaver picture last night?"

I replied that the plate had not yet been developed. The uncertain answer was due to the complications in night photography that sometimes rob one of expected results. Later when the negative was carefully developed, there in the center of the plate appeared the sturdy figure of the beaver, its coat glistening in the brilliant artificial light. Even the broad, flattened tail showed beneath the clear waters of the woodland pool.

The following week Colonel Roosevelt was shot by a would-be assassin as he was

about to address a meeting in Milwaukee. While he was convalescing in the hospital, I sent him a copy of this picture showing the beaver repairing its dam, with an inscription on the back reading, "Here is the answer to your question of October 12."

Through adaptation to the seasonal food supply, the beaver feeds from May to October on the more perishable aquatic growths and on many varieties of land plants, bushes, and vines. It conserves the arboreal supply for a time when the deciduous plants yield to the frosts or gradually chilling waters. In higher altitudes, where water from springs or in glacial streams is often too cold for vegetation, the beaver depends upon bank willows, weeds, and the other small growths, although occasionally it eats at the base the bark of poplars or birches. The tree seldom is cut before fall.

INDIANS LET BEAVERS ALONE

Prior to 1700 the Indians of the upper lakes seldom molested beavers for domestic use, for, aside from decorative purposes, they preferred larger skins. The early explorers found meadows and alder-covered flats in places where the original forest had been



AN ANCIENT BEAVER DAM ABOUT 1,500 FEET LONG FORMS ECHO LAKE

The tree-grown bank on the left is the dam, probably several hundred years old. This Grand Island lake is a mile long. It was much frequented by game animals when they were abundant.



TOWING MATERIAL IN TO THE DAM IS ARDUOUS

Little wonder that the beaver does this work at night, for he must swim high in the water to handle the floating pole and therefore expose his body to the view of possible enemies.



BEAVERS FILLED IN THE SLUICeway OF AN OLD DAM NEAR CAMP

When the animals had the opening two-thirds full of sticks, they interwove them with small branches and grasses and weighted them with stones and mud.

killed by flooding caused by beaver dams. The watercourses were fringed almost entirely with conifers, so that the lake region in the beginning was not a particularly good beaver country.

With the exhaustion of aquatic plants, willows, alders, and black ash, within reach of a colony, the animals migrated elsewhere. Cycles of occupation and abandonment were regulated entirely by the question of food. After the arrival of the trappers it did not take long to reduce these numerous but scattered colonies, and for 150 years there was a succession of good trapping periods followed by poor ones.

When I first visited the Lake Superior region, not one stream in a dozen of the lake-shore drainage showed any recent signs of beavers. Most of the animals were found at the headwaters of the streams on little inland lakes in localities where the Ojibways never lived, and the white trapper sometimes overlooked them.

In 1867, three years before I went to northern Michigan, a monograph on "The American Beaver and His Works," by L. H. Morgan, appeared in print, the most original and valuable biography ever written of this animal, and still regarded as a classic in zoological literature.

Mr. Morgan resided in Marquette County for a number of years, engaged as an engineer with the building of railroads and furnaces. On his many trips into the woods he always employed Jack La Pete as his principal guide, and from the latter I learned much about this indefatigable investigator.

HONOR TO A NATURALIST

His collection of beaver skulls and bones led us to nickname him "the fossil," for, boylike, we thought a predilection for such relics savored of mental eccentricity. It is now a pleasure to me to join in the public appreciation of this remarkable man and to be able to note the great changes that have



HE IS CUTTING DOWN A 91-INCH BLACK ASH AT WHITEFISH

The main winter food of the beavers along the shores was obtained from the hundreds of such trees growing near the water. Sometimes they were reached by side channels or by canals made by the animals. After the saplings were cut, larger and larger ones were attacked.

occurred or are taking place in the localities he visited.

In 1911 I found fresh cuttings and located a beaver burrow deep within a bank at the south end of Whitefish Lake. The following year, in enlarging its living quarters, the beaver broke through the surface soil and then covered the opening with a mass of sticks.

The same fall the eviction of the two-year-old beavers from this burrow led to the establishment of a colony on the river not far above camp, where a large house was

built of sticks and covered with mud. The house was not finished, however, until the middle of November, and the ice prevented the collection of the winter supply of food.

HARD TIMES IN BEAVER LAND

The next spring stumps of half a dozen black ash trees cut five feet above the ground revealed the plight of the beavers during the winter and showed the snow level at the time of their desperate harvesting. When the ice melted in the lake, there arose



BEAVERS CUT SOME TREES TO FALL WHERE THEY WISH

Comparison of this trunk with that pictured on the opposite page will show how cunning the animals are in their engineering work.

to the surface a large number of yellow-lily roots, some of them six feet long, from which the tender shoots and outer covering had been removed, indicating that the beavers had passed beneath the ice to the lake in search of food at a time when zero weather may have prevented forays above ground.

No lumbering having been done about the river and lake except for the removal of a few large pines, there was an absence of all second-growth timber, and the beavers had to depend largely on the long stretch of black ash bordering the river and parts of the lake. After all the smaller trees had been cut, the remainder, measuring from 40 to 90 inches in circumference, were attacked.

When the river colony was estimated to contain eight animals, there were two seasons, 1918 and 1919, during which from 25 to 30 trees were in the process of being cut at the same time. Few, if any, of these animals devoted their efforts to a single tree until the work was finished. On an average this intermittent cutting went on from 10 to 15 days before large trees were felled.

The beavers on the river were never seen in the daytime; for the narrow, shallow waters prevented excursions; but on the lake it was not unusual to see some swimming about late in the afternoon. Those about camp had no dams. They were not permitted to block the river, and consequently the taking of a flashlight picture while a tree was being cut seemed to offer the best chance to photograph a beaver at work.

For three weeks without result a camera and flashlight faced a half-cut tree. On departing for the East, I told John to leave the camera out a few days longer.

PHOTOGRAPHY SOLVES A PROBLEM CONCERNING BEAVER ENGINEERING

A night or two later a loud explosion was heard up the stream, and the undeveloped plates were sent me with the hope that the picture of a beaver at work would be found. The results gave much encouragement for continuation of the efforts during the next season.

Although luck varied during the ensuing years, it was not long before I had a dozen or more pictures showing some of the animals erect and busily gnawing, and others

walking about at the base of a tree (see pages 305 and 312).

My photographs made possible the determination of the moot question as to whether more than one beaver assists at the same time in the cutting of a tree. In not a single instance was more than one animal shown at work, or in the vicinity of the tree, nor was a tree that had figured in a picture touched again during the same season. My experiment seems to prove that a tree is worked at by only one animal, and that in this instance the creature had been too much frightened by the flashlight explosion to return to its labors.

From the very beginning the river colony tried every fall to block the sluiceway at an old logging dam several hundred yards above camp. They filled it with water-soaked logs and branches; their purpose was to flood the river bottom so that they might more easily gather and store their winter food. Each fall it has been a case here of "pull out in the morning and fill in at night."

The efforts on the part of the beavers to utilize the dam resulted from a very practical conception, but it conflicted with human desires. Its success would have prevented our ready access to the lake.

WATCHING BEAVERS AT WORK

The almost daily removal of a great mass of sticks and brush caused John to experiment in an endeavor to find some way of discouraging this nightly activity. He placed a lighted lantern at the middle of the dam, with the expectation that it would



THE GIRDLING CUT IS COMMON

Obviously the beaver loggers were less concerned about the direction of the fall of this tree than of that shown on the opposite page.

end the difficulty. The first night the plan was successful, but the next the animals were busier than ever. Then the lantern was lowered to the surface of the water, but they paid no further attention to it.

Taking advantage of this situation, we visited the place at night to observe the beavers at work. Such a close view under a strong light revealed perfectly their methods of construction. The next night the flashlight and camera took our place to record permanently the scenes then visible to only a few persons.

As the result of a long closed season in 1919, beavers began to increase notably in some districts of northern Michigan, and lumbermen complained that they were



BEAVERS SOMETIMES VARY THEIR METHODS

Here the bark and some of the wood down the trunk to the ground have been removed in an unusual manner. The work may have been done by an inexperienced youngster or by a curiously aberrant old one.

causing damage to timber by flooding land above their dams. These accusations were echoed and re-echoed by designing trappers, who exaggerated both the abundance of the animals and the damage done by them.

The selfish clamor resulted in the Legislature's declaring an open season on beavers, and the trappers, at once concentrating on those localities in which they had become numerous, nearly exterminated them over a large part of the occupied area. The rapidity with which they were captured at this time is evident from the report of a game warden that 600 of them were caught in Dickinson County within 90 days.

A much better policy would have been for the State Conservation Commission to trap

alive the surplus beavers in areas in which they might have become too numerous and to distribute them for restocking purposes in many streams and ponds in which none was to be found. Such action would have increased the value of hundreds of thousands of acres of cut-over land on which otherwise worthless second growth timber exists.

Under such a system, persisted in and accompanied by the proper enforcement of the law protecting this breeding stock, the beaver population of northern Michigan would have increased within a comparatively few years to a point never reached before. Then under wise regulation the surplus animals might have been taken year after year, and every community could have benefited by this contribution from nature fostered by man on a scale not before attempted.

Unfortunately the destruction of beavers proceeded, and at present

a continuous closed season is again in operation. To judge by accounts published in local newspapers, even the pitiful remnant of beavers left in this region, which must be relied upon to restock the area, is suffering from shameless slaughter by poachers.

The history of the beaver in northern Michigan is not pleasant to contemplate. It is an example of the wasteful manner in which Americans have so often wantonly misused some of their wild-life resources.

In a locality long occupied by beavers the trees near the water are used, and the animals are forced to go farther and farther back until the limit of their foraging radius is reached. Where the ground is



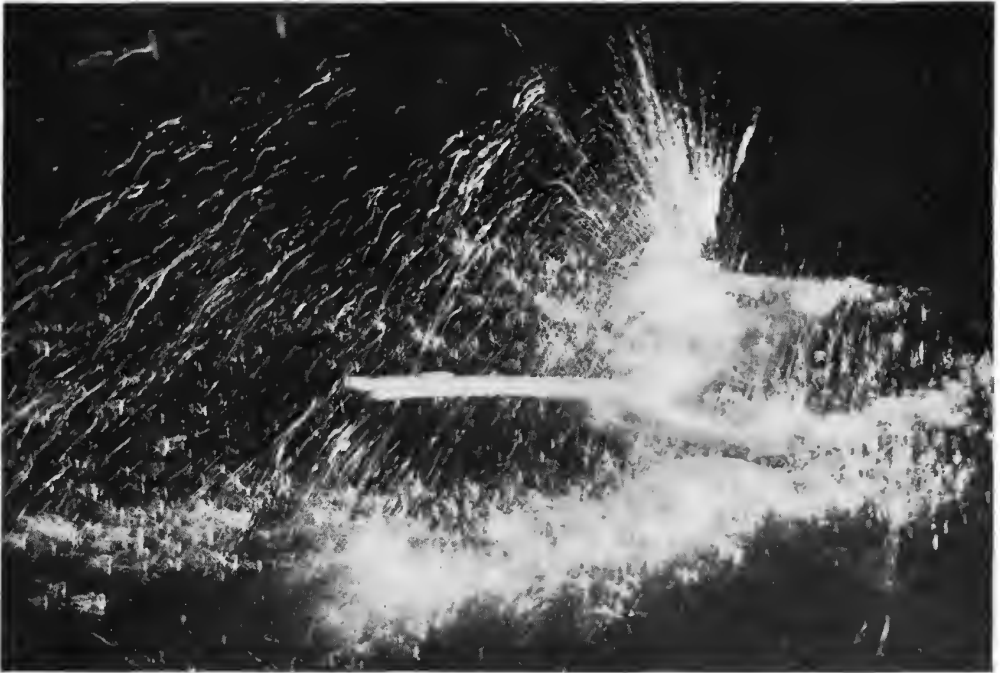
BARK MAKES AN ENJOYABLE LUNCHEON

This fellow is busy with poplar sticks attached to the camera cord for bait. Beavers of northern Michigan are the darkest and most richly colored known.



A NEW BEAVER HOUSE WAITS ITS MUD COAT

The supply of branches and small sticks has not yet been sunk in front of the dwelling. A chimney-like vent runs to the roof for ventilation. This picture was taken in October, 1934.



COMRADES, BEWARE!

A full-grown beaver weighing from 45 to 60 pounds was suddenly startled by a pistol shot. He struck the water such a powerful blow with its flat tail that the air was filled with flying spray. On a still night such a tocsin can be heard for a mile or more.

near enough to the water level to make the digging of canals practicable, these are commonly made by the beavers to facilitate the transportation of small logs and sections of branches to their houses or dams.

I have seen such canals more than 200 feet long and about two feet wide, containing from one to two feet of water. These canals are commonly in connection with ponds above beaver dams so that the water in them is stabilized (see illustration, page 306).

My observations indicate that adult beavers fell trees in a careful and skillful manner. Sometimes, of course, falling trees cut by them lodge against others and remain in that position. The animals are then forced to fell others.

Of the hundreds of black ash cut down by beaver along the Whitefish River, none ever fell into the water, although many of these trees were within a few yards of the stream. By dropping the trees on shore, the animals can readily dismember them, but were one of them to fall into the water I doubt if the beaver could cut off the larger branches below the surface. In Ontario I once found a large poplar, cut down the

previous season. It had fallen into the water. The upper branches had all been removed, but the larger ones below the surface had not been cut.

Mainly through the leadership of Vernon Bailey, of the Biological Survey, beaver farming has been undertaken in Michigan. The results are promising for success.

It is difficult to account for the prompt submission of newly captured beavers to being handled and controlled by man. When free in their native haunts, they promptly disappear at the first indication of danger.

A remarkable illustration of the amiable acceptance of man as a friend by newly caught beavers was given by Vernon Bailey before the Rotary Club of Marquette, in 1925. He placed on top of the speaker's table a sack containing a large old beaver that had been captured alive only the day before in a wire trap of his invention.

When the sack was removed, the beaver gazed unconcernedly about at the audience as Mr. Bailey gently stroked its back. It nibbled some small branches placed before it for a time, alternating this activity with brief periods of sleep.

CHAPTER XVIII

Albino and Other Porcupines; Snowshoe Rabbits and Cottontails

THE common porcupine is familiar in the dark evergreen forests of North America, from the Allegheny and Rocky Mountain regions to the limit of trees in the far North. Though there is only a single species in this great area, varying climatic conditions have developed several geographic subspecies.

The subspecies of eastern North America, including the Lake Superior region, is known as the Canadian porcupine. It is slow, clumsy, dull-witted, solitary when abroad, and of limited individual range. It is nearest among our mammals, in its sluggish bodily movements and mentality, to the anteaters and sloths of the tropical forests.

A STRANGE BEAST

Throughout the year porcupines occupy hollow logs or caves among the rocks. A dozen or more may make communal use of one rock shelter, or a solitary individual may remain in the top of a tree for days, or even weeks at a time, especially in winter. The bark and needles of conifers afford an abundant food supply.

Although the porcupines do not fully hibernate in northern Michigan, where for nearly half the year the snow lies deep on the ground, many of them pass much of the severe weather within the shelter of their dens in a semitorpid condition. The drifting snow covers their retreats and hides all trace of their presence until the weather moderates.

During the winter thaws and more often early in the spring their deep, wide furrows may be seen criss-crossing the surface of the receding snow. They seek to break their long fast on the tender bark of pine saplings, on the swelling buds of the sugar maples, or on the half-opened leaves of their favorite tree, the elm.

Porcupines inhabit the coldest climes; yet they are generally rather susceptible to sudden changes of temperature. Even in mid-summer, if the wind turns northerly or the air becomes damp and penetrating with the drizzling rains of such a latitude, one may look for them in vain.

Whenever the soft winds blow and the setting sun leaves the darkening shore still alight in the afterglow of a summer evening,

the shores of little lakes and ponds may fairly bristle with these waddling creatures. In the days long ago, when I used the rifle, and the game season opened much earlier than now, the appearance of porcupines along the watercourses as evening approached was the almost certain harbinger of venison before twilight dimmed the sights. Deer move about much more freely under the conditions described.

Usually porcupines are tenacious of life, but a single vigorous blow with a stick at the base of the skull will kill them instantly. Their length of life under natural conditions has not been accurately determined. However, it probably does not exceed 10 to 12 years. Every year thousands of them are killed by hunters and lumbermen and not a few by tenderfeet and young boys, whose first sight of this apparently ferocious beast leads them to believe it a work of heroism to shoot or club to death the least aggressive of the animals of the American forest.

When the Indians were numerous along the Great Lakes, porcupines were used for food, and their quills, variously colored by native dyes, were prized as the principal material for ornamenting moccasins, hunting shirts, birch-bark baskets, and the like. Few practical uses remain to the porcupine, except in Alaska and northern Canada, where the natives and some transient explorers still regard it as toothsome.

SOMETIMES TEMPERAMENTAL

Although porcupines usually possess a stolid and even temperament, I learned as a youth that they are sometimes quarrelsome. One day as I was walking in the forest, strange grunts, groans, and a peculiar snarling attracted my attention to a spot nearby. Approaching cautiously, I found two large porcupines in vicious combat. One, with its head partly under a log, was switching its well-armed tail from side to side to keep the other at bay.

I separated them finally. A dozen long quills were sticking in the face of one, and the head of the other was equally bristling.

It is the ordinary habit of a porcupine to turn its head away from danger and fend off any enemies by striking with the tail.



A CHANCE ENCOUNTER

This was the only occasion on which the author pictured adult porcupines in such apparently friendly contact. He once found two in deadly combat (see text, page 321).

Each of these animals had become the victim of quills intended primarily for defense and not for aggression. It is probable that they suffered greatly and may have died eventually as the result of an unusual battle.

The porcupine mates in November, and its single young is born in a cave or hollow log 16 weeks later. The males consort with the females for several weeks and there seems to be little if any rivalry among them during the mating season.

The young porcupine is covered with bluish black hair, which hides the short quills for a month or so. Being almost defenseless in the beginning, before its spines are well developed, it is much more timid than its parents and more active in eluding

foes, even avoiding those not feared by the older animals.

Parke H. Struthers, who has made a special study of the porcupine, says that the young walk about and try to escape danger when less than a day old, and in a week can forage for food independently of the mother. A young one gains about five pounds a year for the first three years. Some males I have seen weighed about 30 pounds, although the average weight among adults is about half as much.

The porcupine is purely a vegetarian, living on bark, buds, leaves, water plants, and other vegetation, which, being abundant in its range, renders starvation impossible. In the absence of any enemies except



A WANDERER APPEARS BEFORE NIGHTFALL

By chance this porcupine was taken by a combination of daylight and flashlight photography as it was out on a nearly submerged log after water lilies early in the evening.

man and occasional carnivores, which often have cause to regret any attacks they may make, this hardy creature would soon overpopulate the woods were it a prolific breeder like most other rodents. But since it bears only a single young one each year, the increase is slow, and when the species proves too destructive to tree life, little effort is required to reduce its numbers.

One fall, while looking for a good place in which to set out the camera, I found a compact area in which the majority of certain mature trees had been stripped of some bark by porcupines. I made careful examination and counted 18 silver birches, 5 elms, 4 maples, and 3 each of white pine and hem-

lock. Not one of the numerous balsam trees had been touched.

In only two instances were the trees completely girdled, and in each case this girdling was not done in a single year. In the same neighborhood the upper and terminal limbs of a number of young pines were denuded of bark, and in several cases the trees were dead or dying.

The strong teeth of the porcupine are admirably adapted for removing heavy bark and, like the beaver, this animal can chisel out large chips. The picture on page 326 shows how cleanly the bark was removed and eaten, the inner wood exhibiting plainly the scoring made by the flat teeth. It also



THE TREE HOUSE SUITS HIS TASTE

This porcupine perched high in a tree near the Whitefish camp and lived on the bark of his temporary home.



PORCUPINES WILL PERCH FOR DAYS IN TREETOPS

They enjoy their own company and seldom appear in groups, though males and females consort for a considerable period.



A MOTHER TAKES A STROLL WITH HER OFFSPRING

The porcupine has a single young. This is fortunate for plants, since the animals' protective spines insure them an average long life, and if they were as prolific as many other rodents they would become a scourge.



A PORCUPINE HAS HALF GIRDLED THIS TRUNK

It devoted three days to eating the bark from the birch. It then began work on another tree. The procedure was noticed so frequently that it appeared almost as if the animals avoided completely girdling and killing the trees. It is known, however, that they do girdle trees, especially high up in the tops. The scars left by the porcupine's teeth show plainly on the sapwood where the inner bark has been scraped away (see text, page 323).

discloses that the animal removed the bark on not more than half of the circumference of the tree.

Sometimes one hears a lumberman complain of the extensive destruction of growing timber by porcupines. My observations in northern Michigan suggest that this depends largely upon the abundance and variety of other food available.

Along the south shore of Lake Superior, in a period of nearly 40 years, I have never seen any particular evidence of such de-

struction. Many elms were pruned year after year of their lateral limbs, so that such trees grew long and straight like poplars. Sometimes sugar maples and beech trees were partly girdled at the base, yet there was usually enough bark left to prevent the trees from dying.

I have seen a few young pines more or less injured, or occasionally even destroyed, by porcupines, but so scattered and inconsequent were the injuries that they attracted little attention. In this region, however, the forest is composed of many kinds of mixed timber, as well as second growth and shrubbery.

At the northwestern end of Lake Superior, particularly in Minnesota, I saw much evidence of injury to the young pines. I often saw from the canoe the upper limbs of trees recently denuded of their bark. Sometimes as many as 15 or 20 trees in a group had been destroyed thus.

On the higher ranges of the Rocky Mountains I have also seen many trees that had been killed by porcupines. The trees in both cases, however, were almost all conifers, and there was a marked absence of the hard and soft wood timber so plentiful along the south shore of Lake Superior.

The first sight of a bristling porcupine in the woods is likely to create amazement, and even some alarm in the beholder, for the bulky animals bristle and appear to increase in size and to eye the intruder in a menacing way. All of this is merely a "bluff" put up by one of the most stupid of our wild animals. So long as it is not molested, the porcupine is one of the most inoffensive of creatures.

The defensive armament of the porcupine, which it presents in threatening array, is made up of modified hairs called "quills" that cover all parts of its body except the middle of its belly and the inner sides of its legs. When the animal is undisturbed, the quills lie close along the body. They are virtually concealed by long overlying hairs except on the rump and back of the neck.

When alarmed and on the defensive, the



HE PULLED THE BAIT

This pale yellowish animal may have been a close relative of the albino porcupine described later in this chapter, for he lived in the neighborhood of its range.

porcupine raises the quills with the long hairs of the body at right angles to the skin, just as the hair rises on the neck of an angry dog. With its back humped the creature becomes a mass of bristling weapons, so that most of its enemies give it a wide berth. It appears at such times much larger than it really is.

QUILLS EFFECTIVE WEAPONS

The quills are longest along the middle of the back, attaining a length of about three to four inches, but they are small in comparison with the gigantic quills on some of the African porcupines. The latter, which

attain a length of nearly 24 inches, are sometimes made into penholders.

The effectiveness of these quills as weapons lies in their thin, exceedingly sharp tips, which for a fraction of an inch are armed with minute barbs. The needlelike point penetrates the skin of another animal at the slightest touch, and the barbs hold it there. The base of the quill is so delicately embedded in the skin of its wearer that the moment the tip is engaged the base becomes free.

If an animal attempts to seize the porcupine, or is struck by the swinging tail, it finds itself pierced by a host of little barbs



A PORCUPINE FIRES THE FLASHLIGHT

Attracted by a bone saturated with salt water, this big black "porky" is shown pulling on the string and photographing himself. The normal distribution of the overlying long hairs is well shown here, the spiny armament being nearly hidden except on the nape and rump, the two points most likely to be seized by an enemy.

driven deep into its mouth and face or other parts. With the movements of the victim's skin and muscles, the barbed tips cause the quills to work more and more deeply into its body until at times they reach a vital organ. Thus the porcupine may kill an animal many times larger than itself.

It is a common thing to find dogs of all kinds bearing evidence of encounters with these slowly moving creatures, which seem to invite attack through their inability to

escape. Quills can usually be removed with a pair of pincers. Ordinarily one encounter is enough to teach a dog wisdom, but I have seen some of them that were so intent on their prey, or so desirous of revenge, that every season they returned home repeatedly in a crestfallen mood and requiring first aid.

The effectiveness of the quills as a protection to an otherwise peculiarly helpless animal in a world filled with flesh-eating enemies is evident from the fact that fossil



AN INVADER ENTERS A BEAVER PRESERVE

This porcupine swam through the pool above the old sluiceway near camp to the mass of green brush the beaver had pulled in for a dam. He came there several nights to enjoy the freshly cut branches. This spiny beast freely entered water about three feet deep to satisfy its appetite.



THE AUTHOR ONCE ACCIDENTALLY CAMPED IN A PORCUPINE CAVE

He learned to his dismay what sort of home he had occupied. The porcupine first looked doubtfully at the cooking outfit and then investigated it. It found the salt bacon tasty.



A PORCUPINE HAS WORKED ON THIS MAPLE

These animals eat many kinds of small vegetation and the bark of several kinds of trees. In the Rocky Mountains and some other areas they are very destructive to young growth, especially pines, so hindering reforestation that it has been necessary to destroy many of them.



A ROUGH FELLOW MAKES READY TO REPEL ATTACK

This porcupine assumed a very warlike attitude with the spines on rump and neck erect and the long overlying hairs raised like a ruff. He was encountered on the bare sandy beach at Whitefish Lake one day. Having no faith in his human neighbors, he prepared for the worst.



THE ALBINO EXHIBITS A NASTY TEMPER

This flashlight recorded the porcupine just as it had bumped its head against a small projecting snag and was biting it in retaliation. It was not until the third summer with this animal that the author and his companions discovered it was both blind and deaf.



THE AUTHOR CONSIDERS THIS HIS BEST PORTRAIT OF THE ALBINO

The white porcupine was found early one July evening, in 1904, making its nightly search for the water plants it loved along the shore of Whitefish Lake. For six consecutive summers this animal was photographed at night in a bay on the border of the lake.

remains are found of porcupines of Miocene times. The species continues to maintain itself in such numbers as to be a serious pest on some of the national forests of the West, where its destruction of mature timber is serious and its attacks on young conifers hinder reforestation.

Seasonal changes by fading in the color of the hair and quills are reported. Individual differences also occur. I took photographs in the same week of one animal with black hair and of one almost white. In Alaska I saw many yellow-haired porcupines that were of almost uniform color throughout the summer and fall.

THE QUILL-SHOOTING FABLE

The old belief, entertained by some persons to the present day, that porcupines "shoot their quills" no doubt had its origin in the sudden and vigorous swing of the animal's bristly tail, which at the slightest

touch fills any luckless opponent with a mass of tiny spines. This fallacy may have been strengthened by the slight adherence of the quills on all parts of the animal's body so that they are readily dislodged. Once, when a boy, I belabored a large porcupine with a stick as it climbed a tree, and at each blow a shower of quills was detached and fell to the ground.

The porcupine would ordinarily increase in numbers more rapidly were it not for its fatal habit of visiting every human habitation near its range in search of salt or of anything possessing a saline flavor. Each homestead, trapper's cabin, or lumber camp will attract in the spring every porcupine for miles about; and if these habitations are temporarily unoccupied, the destruction is likely to be extensive.

After devouring empty pork barrels and everything about the kitchen door that has been saturated with brine or grease from the



TRAIL OF THE WHITE PORCUPINE

The animal always came down to the margin of the lake shore at the point to the left of "a" and, after following the shore around to a point "b," it returned to its home in a small cave hidden alongside a deer trail.

sink, these animals content themselves by gnawing everything containing the slightest salty flavor, including ax handles, garden implements, gunstocks, pack straps, harness, wooden latches, door jambs. Even the trace of salt left on an implement by a perspiring hand attracts them.

Once, many years ago, when I was accustomed to leave my hunting skiffs turned bottom up beneath some heavy hemlocks, I went early in the summer to examine their condition. As I approached the spot, I heard a grinding and crunching sound not unlike that of a distant sawmill.

Within the interior of a decked-over ducking skiff brought the previous year from the East I found three large porcupines putting the finishing touches upon all the ribs and other projections that could be scored by their flat, yellow teeth. The boat was

almost a wreck, and for a time I was puzzled to account for this destruction because such a thing had never happened before.

Jake suggested the solution by asking whether I had not used this boat the previous season on Long Island Sound. Although he had never seen salt water, he knew just as well as these animals did what that meant.

Once when we were spending a day and night at the trout meadows beyond Whitefish Falls, our camp outfit was placed in a large open cave in a sandstone cliff at the edge of the falls, the place affording shelter from any possible rain. A camp fire built at the entrance gave a cheerful light and removed some of the dampness of this retreat.

When we returned at dusk, we were amazed to find two large porcupines in



THE ALBINO GOES OUT FORAGING

Here the blind creature is working its way with extreme caution down the side of a partly submerged log hoping to find water plants.



"WHITEY" HIDES UNDER A FALLEN LOG

This picture was the only one the author obtained of the albino porcupine in the course of the second season after its discovery.



THE WHITE PORCUPINE HAD TO FEEL ITS WAY

Probably no other wild animal save one of this species could exist for years, though both blind and deaf. This photograph was taken in its fifth summer.



BLINDNESS MADE THE ALBINO AWKWARD

In this photograph taken in the fifth summer the white porcupine is cautiously mounting the end of a log it has discovered.

possession. They were evidently at home there and had already collected rent in advance from the new tenants by eating all our salt bacon. The trespassers were driven from the premises and by means of a steady fire prevented from returning. It would be difficult to imagine more objectionable bed-fellows than these prickly creatures.

In June, 1885, I visited Whitefish Camp, of which Jake Brown had been in charge during the winter and spring months. Soon after my arrival I was annoyed and mystified by a strong odor coming up the river. Jake explained the odor. Porcupines, he said, had become such a nuisance about camp that he had been obliged to kill them almost daily and had thrown their bodies into the river.

A STRANGE DAM IN WHITEFISH RIVER

We took the canoe and paddled down the stream to investigate. As we rounded the first bend, a gruesome sight met our eyes. A half-submerged log lay across the stream, and against it lodged all floating objects. There, extending like a dam from bank to bank, several carcasses deep, were Jake's victims. Despite the concentrated odor, he quickly cut one end of the log, and the offensive mass disappeared down the stream.

To my reproof for this slaughter of innocent animals he exclaimed, "Innocent! If you had spent the spring months out here, two of us would have been killing porcupines in place of one.

"They came in droves from miles around, and gnawed away at the doorstep and window sills of the kitchen until it sounded like a set of young sawmills at work. They climbed over the roof and fought for positions on the ridge, uttering hoarse grunts and shrieks until sleep became almost impossible.

"If tools were left out, they gnawed off the handles on which the sweat of hard labor had left a salty flavor. One ate the stock off my rifle, when I left it standing in the corner of an outhouse.

"You had me plant some white birches and elms about the place. I had to keep guard over them until they had been encased in tin collars too high for the animals to climb them.

"One night, on my way barefooted to the well, I stepped on one of these four-footed pincushions and had to spend half an hour with a pair of pincers pulling the quills out

of my foot. 'Innocent' applies to you and not to the porcupines."

This indictment convinced me that Jake was justified in controlling these marauders.

On the afternoon of July 1, 1901, I was photographing deer in a slough at the end of the lake, which lay as if mortised in between sloping hills nearly 400 feet high. As the sun lowered behind the tops of the great pine forest, Jake and I pushed our canoe out from the blind of freshly cut balsam, and under the impetus of two paddles entered the lake on a rapid run for camp.

Near the outlet of the lake, I noticed a small, pure white object, which in the dark shades of the western bank was doubtless much more conspicuous than it would have been in sunlight. What was it?

At this season the rabbits and weasels were no longer white, yet the movements of the object indicated life. There was no breeze to stir a fugitive paper that might have been carried from the house boat in an adjoining bay. It was certain that we were gazing upon an animal never seen here before during the many years this little lake had been traversed by a canoe.

When we were within 100 yards, Jake said that it looked like a young polar bear, but walked like a porcupine—an opinion in which I concurred. Just then it walked into some thick brush, and we approached cautiously.

AN ALBINO PORCUPINE

We were gratified a few minutes later by the sight of a most perfect specimen of albino porcupine. It appeared entirely unconcerned about our presence and was intent upon pulling out of the water a tender mosslike plant, which it ate with great relish. Every part of the body was white—quills, hair, claws, and nose. It is certain it did not have the beady black eyes of the normal animal, but whether or not its eyes were pink could not be determined at the time.

After a careful inspection of the animal, we continued the trip to camp. It was then too dark for an instantaneous daylight picture and too light for a flashlight. We finished a hurried meal and returned for a flashlight picture. Since the moon was full that night, there was no need to use a lantern.

The moon's rays penetrated beneath the overhanging bushes as we reached the locality where we had seen the albino, but not a sight nor a sound of porcupine could



HE HOPED TO FIND FOOD

Blind, the albino porcupine had difficulties not experienced by his normal fellows. Here he clings to the rough bark of a fallen tree and reaches hopefully toward five feet of water where no plants grow.



DIFFICULTY ALMOST PREVENTED THE LAST PHOTOGRAPH OF THE ALBINO

The author found the white porcupine passing under a maple bough. He had to lower the camera and flashlight over the side of the canoe to get the picture.



HERE THE WHITE PORCUPINE LIVED IN SUMMER

Its habits were clocklike in their regularity, and it followed the same route going out to forage and returning (see illustration, page 333).

be noted. Slowly the canoe passed along. At a point about 75 yards south of the place where we had last seen the animal, we heard, from some distance back in the bushes, the soft, crooning notes of a porcupine.

The night was warm and this locality was much frequented by porcupines; it might not be the one we were looking for. After we had waited about 10 minutes, the bushes slowly parted and out in full view walked the snow-white animal.

As it stood broadside and was in the act of raising a mouthful of food in its forefeet, I fired the flash.

Although the little circle was filled with a dazzling light, equalling that of the sun, and much more pronounced in contrast with the moonlight, the animal did not even raise its head, but went on feeding. The plate holders were reversed, the flash was reloaded, and a moment later the animal was pictured while walking toward the deeper water on a half-submerged log.

This time the flash made a considerable report, but neither the noise nor the illumination had any effect on the porcupine. It advanced farther along the log and vainly ran its paws under the surface of the water

in search of aquatic plants. Two more flashes were fired, and our powder was exhausted.

The mystery of this animal's indifference to light and sound and its fruitless effort to find food in deep water puzzled us for several years. Although we watched the shore on many flashlight trips after deer later that season, we saw nothing more of this strange animal.

On the evening of June 28, 1902, after I had been at Whitefish Lake for several days, we became aware that the albino was still there and still occupying its old quarters. When first seen, it was partly concealed behind a number of dead limbs. Only the illuminating and penetrating power of the flashlight made a picture possible. Some of the smoke of the powder drifted toward the porcupine. It fled on the instant, its action suggesting an unusual development of scent perception in an animal not ordinarily dependent upon this sense.

The several pictures of the previous year had attracted much attention. We found that only one specimen of an albino porcupine had been discovered previously and that specimen was preserved in a Vermont



THE WHITE PORCUPINE'S HOME BECAME ITS TOMB

After photographing the albino for six consecutive seasons, the author visited its cave one winter day to find the dead body of his prickly friend. Apparently it had perished quietly from old age.



DESPITE THE ALBINO'S COLOR, HER OFFSPRING WAS OF NORMAL HUE

On the fourth summer this photograph was taken showing the white mother, with her blackish young just beyond her, on the log. Both were feeding on mosslike water plants clawed out of the shallow water.



A CAMP VISITOR FINDS SOMETHING TASTY

When the author was in camp near the outlet of Rock River, on the south shore of Lake Superior, this snowshoe rabbit in its brown summer coat was attracted by a piece of salty paper in which bacon had been wrapped. While it was sampling the dainty, it was easily photographed.

museum. It was suggested, therefore, that I take the animal for a specimen if it appeared the following season.

This I was unwilling to do and, as events proved, my decision to let the freak of nature live and die a natural death was duly rewarded. Every year from 1901 to 1906 I succeeded in getting from one to 10 flashlight pictures of it. Besides, I was able to learn much about its habits, which were greatly modified through infirmities due to albinism. Only once did I see it in full sunlight, and on that occasion I was able not only to substitute "her" for "it," but to

determine the color of the eyes and the condition of eyesight, scent, and hearing.

In June, 1904, as I entered the lake one morning with a party of friends en route to Whitefish Falls, I observed three porcupines on a large log in the reeds 50 yards from shore. The group consisted of a large, dark-colored male, the white porcupine, and a little black cub.

As the loaded canoe approached within 50 feet of the animals, the male became restless and, scrambling along the log, fell off into the shallow water and waded ashore through the reeds. When we came a little



WHEN A LUSCIOUS MORSEL FLEW AWAY, THIS SNOWSHOE RABBIT WAS STARTLED

A spring pole with a carrot attached to the end was bent within a foot of the ground and the bait also attached to another stake driven level with the ground, so that when it was eaten through the spring pole would fly up and set off the flashlight (see text, page 342).

nearer, the little one first tried to huddle up to its mother, but, since she was wandering about continually, it looked at us suspiciously and finally made for the shore, taking a route somewhat to the left of that of the adult male.

The albino, apparently unaware of the sudden departure of her family, continued her efforts to find some kind of an edible plant in the water, crooning softly to herself all the time. Her eyes were a bright, translucent pink, with the fire of the ruby.

What had heretofore been a strong suspicion in regard to her blindness was now apparently settled. I repeatedly placed the blade of a bright-colored maple paddle in front of her and each time she came into collision with it.

By the way she seized the paddle and investigated it with teeth, nose, and feet, it was apparent that this obstacle was a great mystery to her. Feeling sure that she was also deaf, we all cried out in unison, but she showed not the slightest heed.

Finally, we pushed around to the windward. The porcupine showed instant alarm when the scent reached her, and went ashore. When off the log, she circled a few yards and finally took the same course pursued by her young. Of this we were certain, for she climbed over the same log upon which the young porcupine had entered the forest.

Several nights later the camera caught the white mother and her little black cub on this log, feeding on the green, mosslike plant at the edge of the water (see page 339).

In the course of the seven years that this animal was under frequent observation, it never, when alone, departed from the trail along the shore or returned by other than the well-worn path to its cave. Often we were on the lake awaiting its appearance, and invariably it came down to the bank at the same spot, usually between the hours of 7 and 8.

After going south for a distance of about 75 yards, it returned for the remainder of the night to a narrow crevice in a big glaciated rock a short distance back on the path leading to the water. It may be worth noting that the wind was south every evening it appeared, and that consequently it always fed down wind, further evidence perhaps of the dependence it placed upon its nose.

The several pictures of this albino taken on these evening journeys year after year, and of its cavernous home, which in the winter of 1907, enshrouded in the immaculate snows of Lake Superior, became its tomb, tell their own story. The photographs of the porcupine were taken from the bow of a canoe by the aid of a flashlight fired by hand at the instant when the animal was in focus and in the best position.

HOW PORCUPINES TOOK THEIR OWN PICTURES

In places where porcupines are abundant, they are easy animals to photograph. On five occasions I even took their pictures at night on the same plate with deer. But to coax such a stolid, tree-inhabiting rodent to take its own picture by flashlight, and at a spot where the camera must be placed more or less at random, presented something of a problem.

Subsisting almost exclusively upon the bark, twigs, and leaves of certain trees, including, particularly in the fall, the needles of such conifers as the hemlock, this animal

is not often found seeking ground food except in summer, when it visits ponds and lakes for aquatic plants. Consequently months might pass without a picture if the bait used consisted of the common forms of vegetation found throughout its range.

Like most rodents, however, the porcupine enjoys gnawing the bones or shed antlers of wild animals, and possesses a keen relish for any substance impregnated with salt. It seemed to me, therefore, that there could be no more attractive bait than a salted bone.

THE SNOWSHOE RABBIT OR VARYING HARE AFFORDS EXCITING SPORT

Northern Michigan is poorly supplied with game animals other than deer, and in consequence the snowshoe rabbit is much prized by local sportsmen as affording such a contrasting sport to that of deer hunting. With a dog well trained to follow its trail, this so-called rabbit, really a hare, affords exciting sport to many in fall and winter.

By day the rabbits usually hide in the dense growth of swampy places, not seeking the shelter of burrows or hollow logs as do cottontails, and it takes good marksmanship to bowl one over as it darts across openings and along its devious trails ahead of the dog.

The snowy surface of the places these animals frequent in winter is often marked by their little roads, which form a network along which they can easily evade four-footed pursuers. When man joins forces with the dog, however, and takes a stand where he can see some of the runways, the rabbit's most helpful device to escape natural enemies betrays it to the gun.

Here, as in other parts of its range, which includes all the wooded area in the northern half of the continent, occur periods during which the snowshoe rabbit increases in numbers until it becomes excessively abundant. Then it is stricken with some malignant disease that kills all but a comparatively few individuals. These survivors slowly build up the numbers until, after the course of years, they are again abundant.

Whenever Whitefish Lake Camp was without a cat or a dog, the snowshoe rabbits took the freedom of the premises at night. In fact, although the gardener grumbled considerably over the results of their visits to the vegetable patches, they soon learned that they were in a friendly neighborhood and often sat about under the shade of



NOVEMBER FINDS SNOWSHOE RABBITS DONNING WINTER WHITE

With the advance of cold weather their coats gradually change color till they are indistinguishable against the drifts and fields of snow.

bushes so openly that good daylight pictures of them were obtained.

I have sometimes come across fragments of these rabbits left by an owl or a fox and have often seen hundreds of their tracks in freshly fallen snow, and on occasion have snared them for camp use, but rarely have I seen the animals either in the brown pelage of summer or after they whitened on the approach of the winter snows.

Because this rabbit is difficult to photograph and because it is typical of the northern swamps, being a staple winter diet of trappers, homesteaders, explorers, and many Indian tribes, I decided to try for a series of pictures.

In the swamps near by and in the alders along the creek in front of my Michigan camp, there were supposed to be a number of rabbits, therefore I placed a preliminary feast of carrots and cabbages about 100 yards down the stream. Such proximity was an advantage in resetting the camera and flash whenever we saw the blaze or heard the report. If the rabbits should prove to be indifferent to the flashlight as raccoons, skunks, and muskrats, it would

then be possible to get two or more pictures each night.

After a few nights the vegetables were gone. Then a carrot was tied to the end of a string connected with the flashlight. No explosion occurred the first night, however, because the rabbit had quietly eaten the bait without pulling on the string.

I tried suspending a carrot high enough on the trunk of a tree to necessitate the animal's standing up and pulling. The result was a somewhat ridiculous picture, for it is not natural for a rabbit to brace its forefeet and pull for dear life.

A tilting board, arranged so that when the animal stepped on it the flash would be discharged, proved equally futile. A few experiments showed that the visitor always came with a hop and a jump, whether of joy or suspicion I could not tell, and was either moving or out of focus during the flash.

Finally, I bent a spring pole down to within a foot of the ground and tied a carrot to the end of it and to a stake driven level with the soil. When the carrot was eaten through, the pole would fly up, pulling the



THE COTTONTAIL REACHES LAKE SUPERIOR

For several seasons one of these rabbits has been a daily visitor to the flower garden at the author's home in Marquette. They are increasing slowly in the open farming country (see text below).

string connected with the flash. One can imagine the surprised look on the face of the rabbit as the half-eaten carrot leaped into the air, and the powder flashed and roared (see page 341).

When the fall winds from Lake Superior brought the first snowflakes, and it seemed probable that the rabbits had changed from brown to white, I set the camera and flash again. A week passed before a visitor came, for when the alders had lost their leaves, the summer wanderers had retreated to their winter homes in the cedar swamps. One photograph on page 343 depicts a pair, partly in white, nibbling at the last supper furnished from my camp garden in 1912.

COTTONTAILS COME TO MARQUETTE

In all my earlier years in northern Michigan no cottontails were known in that region. With the clearing of the forests and the extension of farming, however, this favorite small-game animal, so common throughout a large part of the United States, has steadily moved northward throughout its range in the eastern part of the country. Apparently it arrived at Marquette about 1920 in numbers sufficient to attract atten-

tion, but it has not yet become numerous there. It must have come slowly northward from its original limit in the lower counties of northern Michigan or from Wisconsin.

For three years a family of these attractive little animals has lived under a wooden building next to my house on the bluff at the border of the residential part of Marquette.

The accompanying picture of one of them was taken in the summer of 1931 while it was feeding on grain I had put out behind my home to attract birds.

We not infrequently see cottontails when driving along the highways leading through the farming sections south of Marquette. They love the thickets about the borders of fields and along fences where they commonly occupy nestlike forms, but often take advantage of holes in the ground or shelter afforded under rocks.

Cottontails are much lighter and more slenderly built and they have smaller feet than snowshoe rabbits. They retain their gray coats throughout the year, thus contrasting strongly with their northern relatives. The cottontail frequents the borders of open country and the snowshoe frequents forests and wooded swamps.

CHAPTER XIX

Camp Flowers in Northern Michigan—Hunting Fungi With a Camera

THE principal trees of the original forest of northern Michigan were hemlock, Canada balsam, spruce, cedar, Norway and white pine, hard maple, beech, oak, yellow birch, elm, and—along streams—black ash.

The second growth for many years after the virgin timber is cut is mainly soft maple, cherry, white birch, mountain ash, and poplar. Amid these the original forest kinds gradually regain their dominance.

A CANOPY OF GREEN

The impressive character of the primitive forest bordering the southern shore of Lake Superior lay in the grouping of certain kinds of trees, which formed a great canopy of green supported by massive trunks free of limbs far above the ground. With such forest growth beauty lies more in the effect of the mass than in the individual trees.

Some northern trees thrive, however, when they grow singly in the open, or in places where the surrounding woody growths are insignificant in size. Such individuals receive the full benefit of both sunlight and the passing breezes and develop symmetrical forms, with widely spreading branches growing low on the trunks.

The oak, maple, white birch, pine, balsam, and spruce so situated have domed or cone-shaped tops, each so distinctive in form that one familiar with trees may distinguish them with considerable certainty at a distance. Such trees often become notable ornaments of the landscape, some of those with widely spreading branches, like oaks and maples, affording grateful shade.

The stately white pines about camp and along the shore of Lake Superior do not grow in the solid stands so common in many parts of the North, though the trees reach an extraordinary height and some may measure as much as five feet in diameter at the base. The hemlocks, on the other hand, interspersed with white pines, often densely occupy the higher ground for many miles.

With the disappearance of the white pine, the hemlock has taken its place with the lumberman, and its thick bark is in great

demand for tanning purposes. It seems rather odd that on my many trips along the north shore of Lake Superior I never saw a hemlock there; whereas spruce, sparsely scattered on the south shore, is extremely common and in demand for pulp wood.

Two south-shore trees that often grow by themselves in the open are the Norway pine and the elm. The Norway pine has a remarkably straight trunk with nearly the same diameter from the ground to where it begins to branch. These trees are usually found on sand plains near the lake shore in places where there is little lower growth other than ground vegetation such as huckleberries or stunted jack pines.

The elm, in handsome groves, is scattered on low ground, often having taken root in meadows formed long ago on the sites of old beaver ponds. By their overflow the pond caused the death of the original forest, and then, filled in, became open glades. Forests later covered these spots.

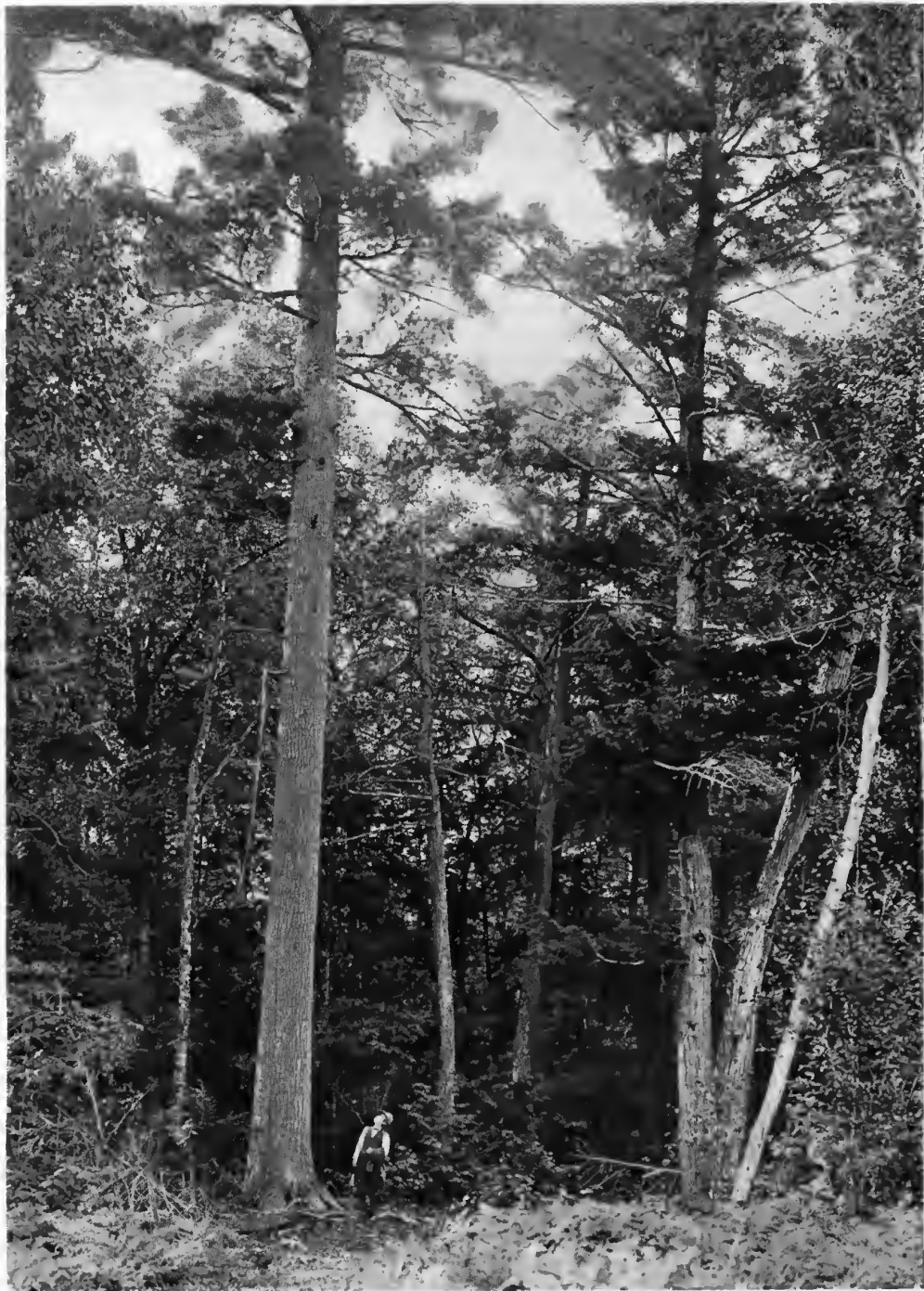
TREES THAT FALL THOUGH WINDS ARE STILL

The white pine rarely decays internally, but the hemlock after passing maturity rots rapidly beneath its thick bark so that an ordinary wind may topple it over. One familiar with this tree can have little sense of security when camping beneath the towering limbs of an old one, however sound it may seem.

The white birch has a much shorter life and decays more rapidly even than the hemlock, its true condition being concealed by an almost imperishable paperlike bark. It also should be avoided by campers until the neighboring trees have been carefully examined. The white birch usually comes as a second-growth tree and is most often found in places where fires or the lumbermen have destroyed the original forest.

It is not unusual on a quiet night, or on a calm day, for frequenters of the forest to hear a great tree that has withstood the gales of many years crash to the ground. Possibly the following incident suggests one of the causes of such an occurrence.

On a particularly still evening I was in a



MOST VALUABLE OF EASTERN CONIFERS IS THE NOBLE WHITE PINE

The smooth tall trunk is typical of these splendid trees when they are standing in the forest. They do not grow in large groups in northern Michigan, but are usually scattered through mixed growth of other species.

canoe with my guide at the head of a little bay in Whitefish Lake, watching for deer. A large hemlock stub 50 feet high stood on the bank above us. It had been there since my boyhood days and had long served as a landmark.

A slight sound attracting our attention, we looked up just in time to see the great hulk of the stub totter for a moment. It fell across the beach a few feet beyond the bow of the canoe, close enough to spatter us with mud and water.

Somewhat mystified by the tree's crashing on such a quiet night, I searched my mind for a possible explanation. When I discovered that the barometer recorded an abnormal atmospheric condition at the time, I naturally began to conjecture whether a marked increase or decrease of the atmospheric pressure might be a contributing cause to the falling of trees in calm weather.

As one traverses the more primitive forests, one finds numberless giant trees lying dead on the forest floor. Many of them may have been overthrown by heavy winds, but a large number appear to have fallen at a ripened age when life had departed and natural forces had destroyed the strength of their fibers. Such trees are likely to decay rapidly, but those overthrown by force while yet in vigorous life may lie intact for many years before they sink into the soil.

SECOND-GROWTH FORESTS AND GAME

It is fortunate that with the serious consideration being given during recent years to reforestation, the relation of forests to game and other wild life is becoming more and more appreciated. A forest planted and maintained purely for the production of timber will not be so useful in favoring wild life as one in which this factor is also one of the objects in view.

It has been said that in Michigan it will require from 75 to 125 years to restore a forest to approximately its original condition. On the other hand, in that region a second-growth forest 12 to 15 years old will afford abundant food and shelter to deer and other game.

Such new forests are far better for game than the older ones of white pines and hemlocks, for the tall trees have no branches low enough for the deer to reach and the heavy shade prevents the development of undergrowth so necessary for both food and shelter for wild things.



CONSPICUOUS MALFORMATIONS ARE OF COMMERCIAL VALUE

In a hardwood maple forest near camp are several large circular excrescences, or burls, which increase year by year. Like a benign tumor, they do not seem to affect the vitality of the tree. These woody protuberances are very tough and fine-grained, never splitting, and therefore useful for high-grade tool handles or small tackle blocks subjected to unusual strain. They have proved superior to the *lignum-vitæ* of South America.

Cedars, which tend to make massed growths in swampy areas, are most important to the deer, since they afford shelter at all times and food in winter. Unfortunately, the growing demand for cedar posts of all sizes is reducing these trees at a rate that is seriously menacing the future of the white-tail in northern Michigan.

Among the second-growth plants are numerous fruit-bearing kinds, such as the



TWO ANCIENT RELICS REPOSE SIDE BY SIDE

Alongside the old lean-to at Whitefish Lake reposed Jack La Pete's original dugout canoe containing a bed of nasturtiums. This was the craft from which the author and his brother each killed their first deer after their arrival at Whitefish Lake in 1871, as described in Chapter I.



A FINE "COVEY" OF WOODLAND FUNGI ADORNS A LARGE HEMLOCK LOG

When the fungus hunter shoulders his tripod and goes into the forest carefully searching for some rare and beautiful specimen and is successful in his quest, he enjoys the same thrills as the gunner who brings from the air the whirling grouse or drops a lordly buck in his tracks.



THE WHITE BIRCH IS QUEEN OF THE FOREST

Loveliest of all the northern trees, it is most plentiful in second-growth area where, in many places, it may outnumber other species. Its grace and beauty, combined with the story of its usefulness to the Indians, give it a peculiar interest.

elderberry, mountain ash, cherry, blackberry, raspberry, and huckleberry. During lumbering operations white clover was introduced everywhere, and in open places it now provides a favorite food for deer, rabbits, and ruffed grouse.

The increase in the food supply for wild life in northern Michigan through the second-growth forest brought with it a multiplication of the number of deer and of ruffed grouse to an extent previously unknown. The increase of wild fruits has also resulted in a great increase in the robins.

The clearing of the forest on one tract about 50 miles square in this region was disastrous to wild life, for it was burned over so thoroughly that the top soil was destroyed. Thus reforestation was prevented and the area rendered worthless for agriculture, a blemish on the landscape.

BIRDS AND ANIMALS MULTIPLY IN CUT-OVER AREAS

Partly because the subject is not often considered in print, and partly because its significance is so little understood, the wonderful role that second-growth vegetation in deforested areas plays in the distribution and relative numbers of birds and animals is worth further comment.

In the thousands of miles of wilderness surrounding Lake Superior, the present conditions, so far as Nature is concerned, are better for wild life than before the coming of the white man, centuries ago. Food is found in greater abundance and wider variety, and better shelter is provided than ever before—two great factors for a suitable habitat.

In primitive times unbroken evergreen forests covered much of the land. Back from the waters the tops of the towering pines and hemlocks, interlocking, excluded the warm rays of the sun, so that only a scant vegetation struggled in the perpetual shadows and in the sour soil, brown with the successive fall of needles. In other sections, in which ancient hardwood forests predominated, conditions were also unfavorable, for tender bark, leaves, and budding branches within reach of browsing animals were scanty.

In the early lumbering operations only the largest trees were cut, their removal hardly leaving a trace, and a person passing through this densely timbered land seldom expected to see a living thing except, perhaps, a porcupine, a red squirrel, or a woodpecker

drilling on a dying tree. Finally came the period of intensive lumbering, and trees of every kind yielded to the ax or went down beneath the crash of a larger neighbor.

Experienced hunters frequently predicted that the game was doomed. Certainly the sight of cut-over land piled high with wreckage and of the discarded limbs smothering new vegetation gave color to these views. But in a few years decay prepared the devastated areas for a new growth, giving assurance of better things.

Where once stood solid forests of pine, cedar, balsam, and hemlock, came up young trees of different species. Low-branched and dense, they blocked the driven snow and cutting winds, sheltering the game from the eye of man, and putting food within easy reach.

Later came the removal of the matured hard maples, in hundreds of tracts of 20 to 40 acres, creating clearings of unusual size. In these clearings the succeeding deciduous stand differed greatly from the original. It consisted mainly of rapidly growing trees, such as the poplar, white birch, cherry, alder, and mountain ash, interspersed with many different kinds of berries and low-growing plants, including clover and timothy, introduced by the wind-scattered fodder of many a logging team.

To these areas came deer, rabbits, bears, grouse, and hundreds of berry- and insect-eating songsters, many of them new to the land, while the beaver took possession of streams and lakes bordered with the new growths.

It is quite evident that despite man's grasping ways, nature in this region is now providing more abundantly than ever food and shelter for the birds and animals.

These bounties should be appreciated and the wild life of Upper Michigan protected so that it will increase and continue to furnish its valuable contributions to our necessities and our outdoor pleasures.

OLD-FASHIONED FLOWERS LEND CHARM TO THE CAMP

It might be expected that during our long occupancy of the camp at Whitefish Lake members of the family would introduce favorite flowers. Just as the first vegetables were confined to hardy kinds, so the first flowers were hardy perennials.

The path leading from the camp to the boathouse 50 yards away was bordered on both sides with old-fashioned red, yellow,



A FUNGUS ETCHING OF PETER WHITE, FATHER OF MRS. GEORGE SHIRAS, 3D

The smooth velvety white undersurface of bracket fungus lends itself admirably to such art work (see text, page 375). It grows on the sides of trunks of dead trees.



PLEUROTUS SAPIDENS CLIMBS DEAD TREES

Although this fungus may be found often on logs lying on the forest floor, it also occurs high up on standing dead trunks. The ornamental structure of the underside of it adds to its interest.



THE TREE CLIMBER IS GRACEFUL

Like designs of ancient Grecian pottery are the "leaves" of *Pleurotus sapidens* (see, also, page 351, lower).



BRACKET FUNGUS CLINGS TO A STUMP

The closely overlapping formation of *Polyporus fuscus* shown here gives a marked individuality to this species.



LOVELINESS LINGERS IN THE WATER GARDEN AT WHITEFISH LAKE CAMP

At the end is the author's old Long Island Sound ducking boat, named facetiously *Certain Death*, serving its last years as a container of growing flowers.



"FULL MANY A FLOWER IS BORN TO BLUSH UNSEEN"

This handsome bracket fungus (*Polyporus resinosus*) appears to like a shaded place in which to develop its petallike lobes.



A BRACKET FUNGUS (*POLYPORUS APPLANATUS*) REVEALS ITS AGE

Note the annual growth rings marked with match sticks. This is the fruit body of the mycelium threads which permeate the wood of the tree and are not killed by the destruction of the external body. This species has a pure white undersurface which becomes brown at the slightest touch. It is much used for etching, even with a small sharp stick making indelible lines on it (see page 351).

and white roses interspersed with tiger lilies. These continue to grow though planted more than 30 years ago. Close by were patches of sweet williams and foxgloves, which likewise have survived, the foxgloves having spread until they are now in several parts of the garden, especially along the edge of the forest.

This camp is located on high ground eight miles south of Lake Superior. Here the thermometer drops to 40 below zero nearly every winter, for the camp is too far from the lake to receive the full benefit of open water. What has prevented our garden perennials from being winter-killed is an average depth of snow of more than six feet, the first snows coming long in advance of the coldest winter weather. Not infrequently in this region potatoes and carrots have been left safely in the ground all winter, beneath the blanket of snow instead of in the root house.

I was particularly interested in the foxglove, and after it had been growing at the camp for several years, I planted some of the seeds about a cabin on Howe's Lake a mile and a half west of our camp. Although this cabin was abandoned 35 years ago, the foxglove is still abundant, most of it growing close to the edge of the forest. It attains a height of about six feet and for weeks bears a mass of red or white blossoms.

I had much the same experience with the sweet william, for some of its seeds were planted more than 30 years ago near Jack La Pete's cabin, at the south end of the lake. At one time a member of our family, who objected to this flower, had it all dug up at camp. Its restoration there many years later was by seeds taken from old Jack's camp, where this flower is still to be found struggling bravely to survive in the matted grass surrounding the site of the old cabin.

Later the hollyhock and many other varieties of perennials and annuals were introduced, making a special display in a rock and water garden behind the living room. An alcove with sides entirely of glass affords a ready view in three directions.

Here we placed several feeding boxes for the birds and chipmunks, and it proved to be an attractive spot for these small neighbors, especially in wet or cold weather. In the water garden were pink and red water lilies, which also were protected through the winter by the heavy snowfall.

It was in these confined waters that I have observed the skill with which the



SATINY WHITE TRIMMING ENHANCES ITS BEAUTY

This stump-ornamenting species, *Polyporus fuscus*, has the new annual growth of the rim clear white, giving it an unusually handsome appearance.

leopard frogs catch butterflies as they hover over the forget-me-nots edging one side of the pool. When they found that this location furnished both food and lodging, many of these beautiful frogs gathered there, their piping voices lulling some members of the family to sleep, but annoying others.

Along the meadowlike margin of the stream on either side of the boathouse various colored Japanese irises grew profusely, and interspersed among them were vagrant forget-me-nots that have found their way to the water's edge.

Native plants and shrubbery added much to the attractiveness of the camp clearing.



THIS BRACKET FUNGUS IS TEN YEARS OLD

The growth rings on it prove its age. It is on a beech tree. These fungi are so hard and firmly attached to the tree trunks that it requires heavy blows with a hatchet to cut them open, and they are extremely difficult to remove from their anchorage.

Most striking of all were the cat-tails, which, planted in long rows and properly controlled, make the most effective of border water plants. Patches of joe-pye weed, blue flag, and golden-barked willow, with rows of water-loving wild roses contributed color.

High-bush cranberries added to the color display with their profusion of small white flowers, succeeded by green berries, which turn to yellow and then to ruby red in fall, when they are pleasing to the eye of man and to the palates of migrant birds. The mountain ash also contributed its colorful presence and afforded a favorite feeding place for the birds. The attractiveness of apple trees to the ruffed grouse and the opportunity this gave for an intimate acquaintance with this fine bird have been described in an earlier chapter on camp birds.

The wild clematis is conspicuous along our little stream, and when trained to cover rustic bridges or the garden fence it presents graceful garlands of green and white equaled by no other wild vine. The planting of white birches, balsams, and mountain ashes about the borders of the camp garden added to its charm.

FERNS AND ARBUTUS MAKE A CARPET

Ferns, so numerous in this region, especially the large "brakes," lend a graceful touch of feathery green to the north side of the buildings. In May the forest about camp is carpeted by an abundance of delicate arbutus blossoms, and later in the season shady banks of ditches near the edge of the clearing are adorned by a lovely woodland orchid known as the lady's slipper.



AN UNUSUAL BRACKETLIKE FUNGUS ADORNS A LOG

This species, *Pholiota squarrosoides*, is curiously handsome, with its graceful shape and highly ornamental markings on its upper surface.



THE STRANGEST RARITY LOOKED EDIBLE

In all his forest experience the author saw only this one example of the exquisite fungus, *Pholiota squarrosa*, which in color and general appearance gave the impression of a large, half-ripened strawberrylike fruit.



THERE IS BEAUTY IN DECAY

The fine concentric markings on this fungus, *Polystictus hirsutus*, give it an attractive appearance. This is one of many species that make mass attacks on dead wood and hasten its disintegration.



A HOST OF LITTLE BRACKETS ADORN A TREE

These series of closely set, pearl-white fungi, *Polystictus pubescens*, are highly ornamental as they cling to a tall trunk. Little imagination is required to picture them as ladders made by elves of the wood.



THE FOREST PROVIDES "BEEFSTEAK" (POLYPORUS SULPHUREUS)

This large, handsome fungus grew about 300 yards from camp on this log during August for several seasons. It consisted of a mass of fleshy, sulphur yellow sheets weighing a total of about four pounds. Gathered in a basket the "choice cuts" make a luscious feast for all (see text, page 371).



IT IS AS IF THE BUTTON BASKET HAD BEEN UPSET

The smooth round tops of this fungus (*Collybia familia*) appear like disks of old ivory that might be used in dressmaking.



FIVE HUNDRED MUSHROOMS CLUSTER AT THE BASE OF A HARD MAPLE

This species is known as *Hypoloma*. It grows, as shown here, in great profusion and is common throughout the forest.



ON THE END OF A LOG SUCH GROWTH INDICATES DECAY WITHIN

Although they are evidences that dissolution is in progress, many fungi, like this one (*Lentinus vulpinus*), beautify whatever they grow on.



ONE OF THE FOREST DWARFS IS COLLYBIA RADICATA

Many woodland fungi are so small and strange among the towering growth of trees that they seem like bits of a curious pigmy underworld.



A PLEUROTUS GROWS ON A LOG

Such a sight is calculated to make a mushroom hunter's mouth water. Note that the method of attachment to the log is a matter of position. Those on the side have lateral stems, while those on top are nearly or quite central. The species is *Pleurotus sapidus*.

Water gardens have a well merited popularity. Wherever I have made my home for any considerable period within the last 30 years in Washington, Florida, and at Marquette and Whitefish Lake Camp in northern Michigan, I have established them.

THE WATER GARDEN AT WHITEFISH CAMP

The one at the camp has been the most attractive of all. It is within a fenced garden and is located immediately in front of a bay window projecting from one side of the living room. Its walls are of concrete capped with rough slabs of rock to give it a less artificial appearance. About the end

of the garden next the window are low-growing plants, such as pansies, forget-me-nots, and canary vine, which do not obscure the view.

The left side of the little basin is bordered by a double row of tall ferns and the opposite side by clusters of Shasta daisies and Japanese irises. At the far end a growth of stately cat-tails makes a picturesque background. In the water are red, pink, and white water lilies, together with several other kinds of water plants. All these are perennials that require little care from year to year.

Here come butterflies to drink and to take nectar from the flowers, and dragon flies hawk their small prey over the surface and perch delicately on the tips of slender plants. A family of garter snakes once appeared, enjoying a sun bath on the flat top of one of the bordering rocks, but feminine prejudice soon banished them.

PAINTED TURTLES DID NOT LIVE

Both kinds of chipmunks foraged there late in the season for the seeds of flowering plants. For many seasons I brought small painted turtles, which perched motionless on lily pads throughout sunny days but never appeared to survive the severe winters.

Of all the inhabitants of this place, two species of frogs gave the greatest entertainment. By day and night their cheerful chorus indicated contentment in this haven provided by man. The constant succession of events occurring in the little world formed by this small pool made it difficult for a lover of nature sitting in the window overlooking it to keep his mind on any book.

Experiences here afforded evidence that no habitation in a forest clearing in this region need lack beautiful trees, shrubs, vines, and flowers, which nature appears ever ready to foster in restoring the attractions of the landscape even in a region where man has exercised to the full his spirit of destructiveness of primitive conditions.

During the years I passed fishing, or with gun and camera, in the forests of the Whitefish Lake region, I became sufficiently impressed with the appearance of the fungi growing there to begin photographing them. As this variation in my photographic work proceeded, I became more and more awake to the extraordinary variety and often exquisite beauty of these odd forms of life. In shady forests, where the humidity pro-

vided favorable conditions for their growth, they were everywhere, their graceful or grotesque shapes appearing on standing or fallen trees and in the moist soil, each having its special environment.

All this filled me with mixed surprise and admiration. From the rather indifferent attitude, I soon found arising within me the spirit of the huntsman, and the discovery and photographing of a fungus previously unknown to me produced almost as great a thrill as obtaining an unusual picture of a bird or mammal.

At first, the idea of comparing the search for fungi for photographic purposes with the sport of hunting seems far fetched, but in reality there is far more similarity than appears on the surface. When the season arrives and the fungus hunter shoulders his tripod and camera and enters the forest, the degree of success he attains will depend upon his keenness of vision, his alertness, and his woodcraft, as applied to the objects for which he is in search. The same abilities would be needed if he should carry a gun in pursuit of game.

NO BEATEN PATHS TO FIND FUNGI

Should the fungus hunter take a direct course through the forest, he would be no more likely to encounter the most desirable objects of his quest than he would to find a deer or other game. He must appreciate that these strange plants vary greatly in their requirements. Each must have its exact needs met in soil, shade, kinds of decaying wood, degree of moisture, slope exposure, and various other conditions. This means that all parts of the forest must be searched with almost minute care lest some of the rarest and most attractive species be overlooked.

In this pursuit we have another form of interesting and useful outdoor pastime with the camera. I observed that all through the season different kinds of fungi appeared just as did different kinds of flowers. By use of the camera as they appear, one is able to make record not only of their distribution geographically but also of their time of appearance.

If the photographs are taken in a definite area as mine were, the material may be a worthwhile contribution to scientific knowledge. In the course of one favorable season at Whitefish Lake I devoted a large part of several weeks to the pursuit of fungi in the



BRACKET FUNGI ATTACK A DEAD TREE

The manner in which they multiply to attach themselves to decaying wood is illustrated here by a species of *Pleurotus*. They appear first at a small spot where disintegration has begun and spread rapidly.

forest within about a mile of camp. It was found that this work could be done at times when other forms of outdoor activity were impracticable.

One marked advantage in photographing fungi lies in their immobility. Photographs of them can be taken in the shade with the camera resting on a tripod and accurately focused. Then with the use of a small stop, a time exposure can be made. The resulting picture will reveal a sharpness of detail of the object and its surroundings sometimes difficult to obtain with a flower, which may be swayed by each passing breath of air.

Fungi can be photographed during dark and gloomy days, an added advantage,



AN OLD BRANCH HAS EPAULETTES

This is an example of the tree-climbing species, *Pleurotus sapidus*. The species shows much variety in form.



CALLA LILIES OF THE EARTH RESEMBLE REAL FLOWERS

These beautiful fungi (*Pleurotus porrigens*) appear like graceful blossoms pushed up through the soil.



THEY SWARM TO A FEAST ON DEAD WOOD

Some logs are covered by a host of fungi that appear to be competing for its substance. The kind shown here is a species of *Pleurotus*, which in its several forms abounds in the forest.



CAN YOU NAME IT?

Occasionally the author could not have a fungus identified from a photograph. There always exists the possibility of one new to science.



THIS FUNGUS IS ONE OF THE FOREST ODDITIES

The reversed cup-shaped form of this *Pleurotus ostreatus* which has sprung from a fallen log gives it a distinctive character.



ORNAMENTS SPRING FROM THE FOREST FLOOR

The flowerlike fungus on the left, *Pleurotus porrigens*, grows with its white upper parts close to the ground. It has been pulled up to show the long stem extending below the surface. On the right, dwarfed by being in the background, is a very differently formed fungus, *Clavaria stricta*.

since at such times it would be impracticable to photograph birds or mammals. One can always be certain of getting interesting pictures, perhaps of an edible species with a delicious flavor rivaling that of some rare game.

After the negatives have been developed and the prints are made, comes the interesting task of learning the names of these curiously shaped subjects. Certain books will be helpful, but in order to obtain accurate information the beginner should get into touch with the best available scientific authority on the subject, who is often located at the State Agricultural College or some university.

The peculiarities marking the differences between the species are sometimes obscure and difficult to locate, and it must not be forgotten that positive identification of species cannot always be made from the photograph. Study of the specimen itself and of its host-preference must not be neglected.

It will be found that each kind of fungus has been duly christened with a Latin name to distinguish it from its fellows, just as has been done to every beast, bug, and plant,

however humble they may be. The identification of the season's bag of photographic trophies from fungus hunting will make a pleasing occupation for winter days, when one may be vividly reminded of joyous summer days in the forest or in wide open glades.

Camera hunts for fungi may be guided by two distinct incentives for the sportsman-naturalist, one to bring back to camp exposed plates of new and interesting kinds for development in the dark room, and the other to gather well-filled baskets of edible plants in the form of "positives" for the stewpan or the kitchen broiler, thus rewarding the botanist and the epicure.

Fortunately for our peace of mind as well as bodily safety, we once had a week's visit in the early fall by a well-known botanist, who had specialized on edible fungi. Every day he would return to camp with a basket containing the best and most easily determinable mushrooms and toadstools of that character. Through these object lessons we were able to make our subsequent collections with assurance of safety.

Many times after I had obtained practically all the pictures desired, on the way



THE EDIBLE HONEY-MUSHROOM IS FINISHING A MAPLE STUMP

Armillaria mellea is the bane of the orchardist. Note the growth here extending in mass eight feet up the trunk and four feet about the base. To remove the excrescence is useless, for it grows from filaments buried in the wood and will reappear in a short time (see opposite page).



A FOREST TRAGEDY

Armillaria mellea (see opposite page) is shown here beginning its work on the fibers of an old tree. Cutting or breaking off these visible bodies does no good, for the fine filaments of the organism permeate the wood fiber like rootlets and will produce more fruit of the same sort.



A NEST OF PUFF BALLS (*SCLERODERMA VULGARE*)

They are about the size of goose eggs and may be recognized by their many fine brown spots.



STAR PUFF BALLS ARE FLOWERLIKE

These pretty fungi are among the most ornamental of their kind. They belong to the species named *Geaster hygrometricus*.

back to camp I would go to some locality where in a previous season I had found some choice mushrooms and at such times I was often rewarded for my quest. It reminded me of the practice of going with a gun to a certain thicket where I was almost certain to find grouse or rabbits, or the damp banks of a stream where a woodcock or jacksnipe might be flushed.

At one place, a quarter of a mile back of camp, I discovered a large log surmounted by great clusters of a bright yellow fungus which grew in overlapping layers with fluted edges resembling a choice piece of pastry. I was suspicious of the color of this new find so took several pictures of it, but brought none of it back to camp.

When I told the visiting botanist of this discovery, he went with me to the place and we found an unusually large display of the yellow fungus (see illus., page 359).

On sighting it, my companion exclaimed "Why, that is *Polyporus sulphureus*, a tender plant, which when broiled so resembles a steak in flavor that it has become known as the beef-steak mushroom."

Since each cluster weighed several pounds, we had a chance to test and approve of it. For several seasons following we enjoyed these forest dainties taken from the same place.

Among the larger members of the fungi many kinds are edible and make delicious additions to our bills of fare. Other kinds, however, are difficult to distinguish from the edible species and carry a deadly poison for those unfortunate enough to eat them by mistake. One of the edible mushrooms is cultivated on a considerable scale and enters into our commercialized food products. In addition to the large quantity of mushrooms harvested in this country, many millions of pounds are imported each year.

Edible mushrooms are much appreciated both by squirrels and deer, which search for them with avidity at the times when they appear in their forest haunts. In view of the close superficial resemblance between the harmless and the poisonous mushrooms, often growing almost side by side, it is of interest to note that wild animals appear to avoid the harmful kinds.

Any such knowledge must have been gained by long and painful experience far back in time so that it is inherited. Differences in odor between the two kinds of plants are probably the means by which animals distinguish them.



ONE OF THE DEADLY KIND IS AMANITA
VERMA

Many fungi are valuable as a delicately flavored food, but others are a deadly poison. Some wild animals are fond of the harmless sort but appear to know and avoid the others. No one should venture to utilize fungi for food until he has definite knowledge of these characteristics.

The general term fungus is applied to the members of a group of plants low in the scale, so far as their organization is concerned. They vary marvelously in size, form, and color. In popular terms they are known as fungi, toadstools, mushrooms, molds, mildews, and smuts.

Among the larger of their kind are the giant puffballs and some of the bracketlike species that project from dead trees, either standing or fallen. From this size every gradation exists down to the minute species that require the use of a microscope to distinguish them.

STRANGE MEMBERS OF THE PLANT WORLD

Their other differences are equally as marked as their size variations. Many are beautiful in shape and in the delicacy of their colorings; some appear like flat buttons of old ivory; others are pink, white or yellow and may be formed like exquisitely branching coral. Another resembles the calla lily. They may take on globular, fluted, or other outlines of infinite variety. One closely crowded group suggests large ripening strawberries.

Most of these plants live on decaying organic matter, either of vegetable or of animal origin. Many species, however, attack living organisms. They thrive best,



A CURIOUS STUMP-DWELLING FUNGUS SEEMS A VISITOR FROM ANOTHER WORLD

Hydnum erinacea appears like a large whitish sponge a foot or more across. The varieties of these forest growths are legion. They remind one sometimes of the plants of our undersea gardens.



PEAR-SHAPED PUFF BALLS (*LYCOPERDON PIRIFORME*) MAY BE EATEN—SOMETIMES

So long as the flesh is white, these mushrooms are edible, but the amateur should be careful about sampling species of which he is uncertain. They are shown here in characteristic groupings.



A BRANCHING FUNGUS (*CLAVARIA STRICTA*) IS NOT OFTEN SEEN

It is from six to eight inches high and appears quite unlike most other growths of its group; however, it is found occasionally on the forest floor.



A DELICATE FUNGUS SPRINGS FROM A STUMP

This species (*Hydnum coput-ursae*), with its dainty filaments, is a close relative of the kind pictured on page 372.

as a rule, under humid and rather warm atmospheric conditions. Fungi are abundant in humid forests, mainly on the trunks of fallen timber and in the moist soil, made up largely of vegetable humus.

Many minute kinds attack living plants in the forms known as mildews, smuts, and a variety of "blights," among which may be noted the "chestnut blight" that has ruined the splendid chestnut trees once such ornaments to the forests of the Eastern United States. The total losses from these minute enemies of living useful plants amount to billions of dollars. Not all of these microscopic plants are harmful, however, and there are many of them which work to the great advantage of man.

The fungi that attack dead plant and animal matter are as a rule among the beneficent agencies that help reduce such bodies to the humus and other fertilizing elements in the soil upon which new plant growth is so largely based.

Under favorable conditions fungi often appear in swarms overnight, with an almost magical rapidity of growth, as if sown broadcast during the darkness. Among notable examples of this are the puffballs and the graceful "fairy rings." Most of these plants are short lived, and in temperate climates comparatively few survive the winter frosts, but they reproduce the next year from the "spores," which take the place of seeds of the higher forms of plant life.

Some of them, however, are perennial, such as the bracket-like species that appear as excrescences

on the trunks of dead or dying trees, and some of these show well-defined rings marking their annual growth.

SOME USES OF THE BRACKET FUNGUS

Several kinds of the perennial bracket fungus grow horizontally and at right angles on dead stumps or logs in the forest near Whitefish Lake camp. They may exceed two feet in diameter, the upper sides resembling giant clamshells, and the growth each year being marked by growth-rings on the surface. The lower side, nearly plane, is covered with a delicate white frosting upon which may be etched or traced designs of an artistic character. Beneath the white surface is a dark brown back-

ground that is disclosed by the etcher's manipulation.

When thus used, they may last for half a century in excellent condition. About 1890 a lonely Lake Superior lighthouse on a remote island was occupied for many years by a keeper of artistic temperament. Because of his isolation and the fact that he had married an Ojibway squaw, he seldom came in contact with those ashore.

FUNGUS ETCHING REAL ART

He passed most of his spare time in collecting material or etching on fungus and became so expert that he could reproduce a photographic portrait or one in oil with such fidelity of form and expression as almost to equal the original. He also reproduced on the larger brackets historic scenes, or some of his own conceptions with such artistic skill that his work became recognized in many of the art centers of the country. A number of people made collections of these etchings with the same interest as that of collectors of other objects of art.

The shelves in our camp living-room became lined with etched fungi, standing on edge, some bearing crude caricatures of a local incident. Others were more skillfully designed, or contained a couplet or two, and still others bore the signatures of camp guests who found this an appropriate way of recording their appreciation of the visit and its date.

One of the best of these fungus etchings is a portrait of Peter White, sturdy pioneer of Northern Michigan and father of Mrs. Shiras (see illustration, page 351, upper).



THIS FOREST MONARCH IS DOOMED

Although to the eye of the casual observer the tree may look healthy, the huge fungus proves that it is dying.

The likeness is excellent, though of course the passage of years has damaged the smooth surface of the picture.

Older generations will recall boyhood days when a dried piece of bracket fungus was used as "punk" in igniting firecrackers and the like, for it would burn slowly with a ruddy glow, thus furnishing a primitive but dependable tinder in the days when fireworks meant so much to youthful celebrants.

Long after my experiences in hunting fungi with a camera in the swamps and forests about Whitefish Lake Camp in Michigan, I was much gratified to find that Thoreau had enjoyed the same entertainment and interest in locating and studying these strange plants near his Concord home.



CORAL FUNGUS PUTS OUT DELICATE BRANCHES ON A PROSTRATE TREE

Hydnum lancinatum is edible when fresh and white and grows in masses up to 10 inches in diameter.

In 1856, after a series of autumn rambles with Ralph Waldo Emerson, he wrote, "We go admiring the pure and delicate tints of fungi on the surface of the damp swamp, following up along the north side of the brook past the right of the old camp. There are many very beautiful lemon-yellow ones of varied forms, some shaped like buttons,

some becoming finely scalloped on the edge, some club-shaped and hollow and of the most delicate and rare but decided tints, contrasting well with the decaying leaves about them. There are others also pure white, others brown, and some even a light indigo-blue above and beneath and throughout."



CHAPTER XX

The Huron Mountain District; Fishes of Lake Superior

HURON MOUNTAIN lies about 40 miles westerly from Marquette, near the south shore of Lake Superior. When, in 1870, with older members of the family, I camped at the sheltered mouth of Huron River, none of the party realized that only a few miles to the eastward we had passed one of the loveliest series of lakes to be found in the northern country.

Many of these waters are drained by Pine River, which parallels Lake Superior for nearly a mile before breaking through the long sand beach. Pine River, of considerable size for a stream with a limited watershed, was often inaccessible from the great lake because of its exposed position, lake winds making breakers large enough to capsize small boats trying to enter its mouth. For this reason camping parties usually went beyond to Huron River, or L'Anse Bay, where a landing could always be made.

AN IDEAL CAMP SITE

On a trip made in 1880, when an offshore wind made it possible to enter the mouth of Pine River, we were so attracted by the surroundings that we pitched our tent on the long, low bank that separates the river from Lake Superior. A fine grove of Norway pines offered an excellent camping place, and the rowboat, sheltered in the river, made possible some exploring.

After going up the stream half a mile we were blocked by windfalls and, landing, we went across a pine-grown plain to the shores of Pine Lake, unseen by any of us before. While we were crossing the more open country, we saw several flocks of passenger pigeons in search of huckleberries, many of the birds youngsters that had been hatched that year.

On this excursion inland we were surprised at the great number of deer tracks observed along the river and on the shores of the newly found lake. The high, rough group of hills beginning a mile back from Lake Superior and known as Huron Mountain, which we had supposed would be unattractive to deer, proved otherwise, because of the large number of lakes in the vicinity. These, though deep and mostly rock bound, contained some sandy beaches and shallow

bays which caused concentration of these animals in such places.

Our trip being made in midsummer and primarily for trout fishing, we did not attempt to do any deer hunting, but arranged to return at the opening of the season, August 15. Before making this hunt, we obtained some old maps disclosing the existence of many additional lakes to which canoes could be portaged.

SPECKLED TROUT PLENTIFUL

The return visit in August proved the most successful and interesting ever made by any member of the party, and led to successive yearly visits for the next decade. Ten lakes in all were located, ranging from half a mile to more than three miles in length, and varying in altitudes from 7 to 315 feet above Lake Superior. They had maximum depths ranging from 38 to 260 feet, as determined by soundings made in later years.

The most important event of this trip to Pine River was a visit to Salmon Trout River, which enters the lake a couple of miles east of the mouth of Pine River. Afterward I learned that my paternal grandfather, sometimes accompanied by my father, had visited this stream to fish in 1865 and later. Our "discovery" of this unusually good fishing ground was a somewhat belated one.

The several rocky points on either side of Salmon Trout Bay afforded most excellent sport when the larger fish had assembled there preparatory to entering the river to spawn, it being then regarded as legitimate to take fish under such circumstances. On examination, the pools near the mouth of the river were found to contain hundreds of speckled trout varying in weight from 2 to 4½ pounds. These fish were sluggish, and one unduly ambitious member of the party, desirous of making a "record," caught 20 of them weighing about 75 pounds.

The Salmon Trout I have since considered to be the best spawning stream on the south shore of Lake Superior. Since the fishing became poorer and poorer each season in the lake, the temptation to visit this stream as the trout assembled at its



STANNARD ROCK LIGHTHOUSE STANDS ON A SUBMERGED REEF

In the summer of 1870 the author, as a small boy, was one of the occupants of the ten large yawls used in trolling for fish at this point in Lake Superior 46 miles north of Marquette. In a couple of hours ten thousand pounds of fish were taken, and then the slaughter ended (see text, page 394). In the summer of 1934 younger members of the author's family visited the reef in a trim little schooner, in order to determine whether a remnant was left of the vast numbers of fish of 60 years before. The catch was satisfactory, although it required the greater part of the day to capture what a few minutes would have accomplished on the earlier trip. It was worth noting that the largest of the fish caught considerably exceeded in weight any taken before. This was doubtless due to a better food supply than when the fish were so numerous and, naturally, very ravenous.

mouth increased correspondingly. Finally it became a part of the Huron Mountain Club property, and since then has been fished more moderately.

Many years ago I formed the opinion that a State law should prohibit the catching of speckled trout while they are on their spawning beds, while they are going

from Lake Superior into the lower courses of all such streams during the spawning season, and while they are in the lake at this period within 200 yards of either side of the mouths of these streams. Such a law would enable a large portion of the fish to reach the spawning beds and would greatly improve the fishing along the lake shore within 10 or 15 miles from the mouths of such streams. Many more fish would eventually be caught under such regulations than when taken in undue numbers adjacent to or within the entrance to the spawning streams.

EARLY CAMPS AT HURON MOUNTAIN

The camping parties that came to the Huron Mountain region in those early days were usually headed by my uncle, Col. W. R. Howe, his companions being fellow Pittsburghers attracted by the wonderful summer climate and the opportunity to angle for large trout and to shoot deer in close proximity to

camp. One of the principal lakes near Huron Mountain is now known as Howe's Lake in commemoration of this worthy sportsman.

Afterward, nearly every season for years, I joined this party for a few days, not so much to hunt as to renew acquaintance with its members from my native city.

Just before dark one day of such a visit, three deer hunters and the three guides left camp for a hunt on several lakes lying a little to the west. After the fishermen of the party had retired, I was left alone by the smouldering fire.

I decided to go on a deer hunt of my own. Placing a kerosene lamp in a cracker box open on one side, I put this crude jacklight in the bow of an 18-foot rowboat and paddled slowly up Pine River. Since I was not able to swing the light to cover the marshes on either side of the river, I could not detect a deer standing back from the water until it saw the boat and, becoming alarmed, fled into the thick forest. Giving up this endeavor, I turned back toward camp and soon saw the white tents a few yards back from the stream.

GAME FOUND CLOSE TO CAMP

Just as I was about to shove the boat ashore, I heard a splashing sound behind me close to the opposite bank of the river about 150 feet away. Supposing that this noise had been made by a beaver or an otter, I swung the boat around and paddled across.

Ahead of me lay a tall Norway pine that had fallen into the river, nearly paralleling the bank on which rested one end of the trunk. When I was about 50 feet away, the light from the bow of my boat disclosed ripples coming from beneath the tree and a moment later revealed the slender legs of a deer standing in the shallow water by the shore on the other side of the trunk.

I gave a sharp whistle, and the animal raised its head above the slanting tree and was easily shot. The reverberating roar of the heavy gun aroused the sleeping fishermen, who stuck their heads out of the tent in time to see me pulling the deer from beneath the pine. When the other hunters returned at midnight, they were surprised to see in the bow of the big rowboat, a three-year-old buck, which had been dropped in the water within 50 yards of the frying pan.

The results brought to Marquette from time to time of the beauties of the Huron Mountain region led several of its leading citizens, including Peter White, Horatio Seymour, Alfred Kidder, and J. M. Longyear, to organize in 1889 a club for the purpose of acquiring a large section of land there to hold as a recreational area.

Eventually more than 16,000 acres were purchased, behind which lay an almost unknown wilderness. Several years later the organization of the Huron Mountain Club was perfected and certificates of membership were issued, enabling several of us to join an organization that later became famous throughout the Middle West.

A commodious clubhouse was built on the little peninsula between the lake and the river, on the exact spot on which we had formerly camped for so many seasons. Soon thereafter many cottages were built on either side of the river, over which a rustic bridge crossed to the central clubhouse. It was the determination of the original members and of those who joined later to preserve the natural beauty of the surroundings, no cottages being built beyond the river, while the many lakes were made accessible by trails, at the ends of which boathouses sheltered canoes for use on these interior waters.

The desire of the Huron Mountain Club to keep its great tract unspoiled as a wild-life preserve is evident from the following excerpt from a book issued by the club in 1929: "The animal life existing within the region where the club is located constitutes a valuable asset. To make the acquaintance of the wild life is to know the joy of quickening our faculties of sight, hearing, and close observation, little used in our city life. To gain some definite knowledge of the natural history of the place is to make the most of our opportunities. To protect the wild life and preserve it for posterity, leaves a heritage of which we should be proud.

HURON MOUNTAIN CLUB HAD IDEALS

"Excepting the relatively small areas from which the pine has been cut and but for the few necessary roads and trails, the whole forest is in its natural state, and beautiful beyond the power of telling. To stand on a summit on a bright day in early October and to look over the flaming spread of treetops, the glowing colors intensified by contrast with the gray crags and somber evergreens, with the ethereal blue of the waters of the lake in the distance, is to behold one of Nature's most gorgeous and glorious displays."

Originally the unbroken forests of hemlock, pine, and hardwoods, and the rough character of the country about Huron Mountain, made the region less attractive

to deer than at present, especially since timber wolves found a safe haven in the rugged hills. In later years extensive lumbering in the neighborhood was followed by a varied second growth that afforded food and shelter for an unlimited number of deer.

These animals, being given full protection on the club property, could be seen daily, particularly in the clover and alfalfa fields about Ives Lake, where for a while a large club dairy was maintained by the cultivation of meadowlands. As a result of the increase in the numbers of the deer, and the encouragement they got from my long-continued success in obtaining flashlight pictures of the deer on Whitefish Lake 60 miles to the eastward, a number of the younger members of the club took up this method of wild-life photography.

A BAPTISMAL INITIATION

I recall with some amusement the first expedition to photograph deer made one night by three members of the club, two young men and a young woman, who entered a canoe on Pine Lake with an improvised flashlight apparatus. When they had approached within the proper distance of a deer they raised the flashlight overhead and pressed the trigger.

The cap exploded sharply, but for some reason the powder hung fire for an appreciable time and then went off with a loud bang. The startled occupants of the canoe all fell overboard.

As their experience in the use of the flashlight camera increased, these night trips became so successful that I know of no finer series of white-tail pictures than those taken by night photographers from the club on small lakes that no longer resound to the roar of the gun.

The animal and bird life about Huron Mountain differs little from that of the Marquette area described elsewhere. The many species of fish, however, in the small lakes there seem worthy of mention, especially since several of them are peculiar to some of the land-locked lakes.

Most of the lakes lie not far above the level of Lake Superior, but Rush Lake is more than 300 feet higher and Ives Lake is also well elevated. The ascent of fish to both of these lakes from Lake Superior is prevented by waterfalls.

The principal game fishes of the Huron Mountain lakes are the speckled trout and

two kinds of lake trout. That of the lower lakes resembles closely the lake trout of Lake Superior and reaches a weight of about 15 pounds, but the land-locked species peculiar to the deep waters of Rush Lake is distinct and attains a weight of only about two pounds.

Rainbow trout were introduced in 1906, and are now well distributed. The other game species are the small-mouthed black bass, pike, and pickerel.

Among the other kinds of fish reported by Walter Koelz and Carl L. Hubbs, who made a special study of them, are: the red-side and the white sucker; a dozen species of shiners and dace, supplying suitable food for the larger fish; four species of sculpin; rock bass and sunfish; two species of stickleback; the ling, the only fresh-water member of the cod family; the Ives Lake herring, with black fins and large eyes, not found elsewhere; and the lake herring, or cisco, from Lake Superior, which occurs in several of the Huron Mountain lakes.

The list concludes with four kinds of perch, including the wall-eyed and the trout-perch. Some of these native fishes seem to have been left when in ancient times the great Lake Algonquin receded and Lake Superior was isolated at its present level.

The protection and development of these little lakes will prove a source of continuous interest, for they are under the ownership and control of those intent upon preserving the flora and the fauna of a beautiful and extensive area.

FISHES OF THE LAKE SUPERIOR REGION MUST ENDURE COLD WATER

The species of fish in Lake Superior are limited in number, for the depth and purity of the water and the low temperature throughout the year have barred many kinds found in warmer waters. At one time the speckled trout, the lake, or so-called Macinaw, trout, and the whitefish were present in extraordinary numbers, each occupying a somewhat different part of the lake, according to the depth and character of the water, and all living in comparative harmony. The speckled trout depended upon minnows, insects, and crustaceans near the shore; the lake trout had an ample supply of herring; and the whitefish, a deep feeder, in nowise interfered with the others.



BEAUTY SMILES ALONG PINE RIVER, NEAR HURON MOUNTAIN

For nearly a mile above its mouth the stream flows a winding course not far from the lake shore. At the lower end of it cottages of members have been built on either bank near the clubhouse. Note the Norway pine in the foreground, a tree characteristic of the sandy plains near the south shore of Lake Superior.



WAVES LASH THE SHORE NEAR THE MOUTH OF PINE RIVER

This locality was a favorite camping place for the author and his relatives and friends until it was purchased by the Huron Mountain Club, in 1890. The characteristic breakers are shown here, which so often made it difficult and sometimes impossible to enter the mouth of the river with a small boat.



PINE LAKE SEEN FROM A NEIGHBORING HILL SPREADS OUT ITS LURE

This is the largest and perhaps the most picturesque lake on the land of the Huron Mountain Club. It is surrounded by forest where many deer live. The members of the organization take pride in preserving it in a wild state (see text, page 383).



LAKE TROUT ARE NOT SO ABUNDANT AS IN EARLY DAYS

Overfishing has reduced the number of these valuable fish in Lake Superior, which with the whitefish shown on the opposite page, have constituted the principal commercial crop of the waters.

Over a period of 90 years, four generations of my family have cast flies in Lake Superior and its tributary streams, and accumulated much knowledge regarding speckled trout (*Salmo fontinalis*). My paternal grandfather first came to this region in 1849, intent solely on trout, for he had heard from pioneer business friends of the beauty and healthfulness of the country and the wonderful trout fishing. At the time of his earlier visits one wishing to stop at any of the few settlements on the great lake was obliged to transfer around the Sault rapids and take a small steamer that plied the waters beyond.

THE AUTHOR'S GRANDFATHER FISHED

To one who had fished only the brook trout of the Allegheny Mountains, the size, brilliancy, and activity of those in Lake Superior were a source of delight. For many years after his first visit, my grandfather seldom fished any tributary streams. The smaller fish in such waters and the ease of their capture did not appeal to him. He was accustomed to make his own bamboo rods, flies, dip nets, and seines for catching minnows, and he either fished from a little rowboat anchored in a suitable location, or from some of the many rocky points separating bays where there was steady movement of the larger trout.

When my grandfather visited Lake Superior before the building of the locks at the outlet, he always paused for a few weeks before going on to Marquette to fish for trout in or below the rapids of the Sault Sainte Marie River. In these rapids, for

untold centuries, the Ojibways had been wont to spear or net their supply of whitefish. The swift waters, remaining open during the winter, furnished a dependable supply of food for these Indians throughout the year.

When steamers began to pass close to the rapids in the canal leading into Lake Superior, many passengers were accustomed to shoot the rapids in birch-bark canoes, and as often as not they brought back to the steamer whitefish taken in a dip net from the surging waters by one of their Indian paddlers. In the same locality, both large speckled trout and whitefish lay in eddies behind submerged boulders.

My grandfather was known locally as the "Lone Fisherman" from his habit of always fishing alone in a small rowboat. He would haul this boat along the shore with a rope to the head of the rapids and then drop down to some promising eddy, where he would cast anchor, and begin the pursuit of trout with rod and reel.

THE ANCIENT FISHERMAN SKILLFUL

As the years passed and the buffeting about in the rapids became too strenuous for him, this ancient fisherman would float down the river for several miles and anchor at a place where some small island or rocky point caused an eddy to form in the swift waters. The number and the size of the individual fish he took in these later years excited the envy of all other anglers.

The old gentleman was taciturn in regard to his methods, however, and although watchers along the shore attempted to solve



EPICURES APPRECIATE THE WHITEFISH OF LAKE SUPERIOR

Considered the choicest fresh-water fish of America, this species has been for years the prize of commercial fishermen. Like the lake trout shown on the opposite page, it is becoming scarce.

the mystery, they had no success. It was not until my grandfather told me of a most unusual happening that the secret leaked out.

He said that on one trip his hook became snagged on the bottom at a point where the water was about 20 feet deep. Pulling gently on the line, he noticed by the feel that the snag was coming up, and in a few moments there appeared a bamboo rod that he had lost overboard the previous year. His hook had become engaged in the heavy brass reel of the sunken rod and this enabled him to recover a favorite product of his own handiwork. The bamboo rods of those days were not split, and with the heavy brass ferrules, sockets, and reel, they would not float.

Having told me the story of the recovered rod, he asked if I did not think this was a most extraordinary occurrence. I admitted that it was, but added that I was more interested in finding out how a hook could reach the bottom in such swift waters. He hesitated a moment, and then said with a smile that his answer would solve the mystery of his successful catches.

THE AGED WIZARD FINALLY REVEALS HIS SECRET

Ten feet from the hook he fastened a small ball of lead to the line, so that when the weight reached the bottom, the line beyond would rise several feet and move in the swirling waters. There the larger trout, lurking in the depths, would seize the bait, and soon be brought to the hand net.

On these fishing excursions to the Sault, my grandfather always stopped at a small

hotel known as the Chippewa House, whose long-time landlord had always shown great interest in his comfort. At the age of 88 years he made his usual trip, and on the day of his arrival the landlord called him to one side and said that he had bad news for him about the small rowboat he had used in fishing, one which grandfather had built for this purpose. He explained that an Irishman living on the bank of the river had chopped up the boat for firewood the winter before.

NEWS THAT WAS PREMATURE

At this irritating news grandfather said that he would see Pat and express his opinion of him. Seizing his heavy cane, he plodded down to the offender's cabin. Entering the front gate he saw Pat wielding an ax on the flotsam and jetsam he had collected from the river.

The moment Pat saw his visitor he dropped his ax and threw up both hands, exclaiming, "Good God! You still alive!"

Without a word my grandfather turned and retraced his steps to the hotel. When asked about the encounter, he replied, "Pat seemed to be so sincere in his belief that I would never return again, in which he was probably only a little premature, that I did not have the heart to say anything."

The following summer the "Lone Fisherman" failed to appear again. He had died at his home in Pittsburgh.

Prior to 1890 the range of the speckled trout included all the shore waters of Lake Superior for more than 1,000 miles, except in places where sand beaches lacked coarse gravel or boulders, or where the continuous



A CANOE BRAVES THE SAULT SAINTE MARIE AT THE OUTLET OF LAKE SUPERIOR

This view shows the turbulent waters in which the author's grandfather fished so successfully for trout in 1850 and later (see text, page 389). About 1900 he introduced rainbow trout from Lake Superior. Located in the rapids in large numbers, they afforded fine sport until the building of the ship and water-power canals, which lessened both the beauty of the rapids and the opportunities for angling.

cliffs made the steady surge of the waves an unsuitable location for a fish that particularly dislikes turbid or unsheltered waters. Every stream tributary to the lake also contained trout as its principal permanent occupants, with the temporary addition during the spawning season of the speckled trout from the lake, unless the streams had their origin in shallow headwater lakes. In such cases the consequent higher temperature of the water favored the existence of pickerel or bass, and eliminated the trout.

Good trout fishing in the lake was within easy reach of every settlement and camping place, the fish occupying a narrow strip within 50 feet of the shore or about islets and reefs nearby. Beyond this were the giant lake trout, which, while respecting the riparian rights of their more aristocratic kin, allowed no trespass into their own domain.

On the other hand, just to the east, Lake Huron, including Georgian Bay and also the waters of the southern part of Ontario, contained no speckled trout except in a few isolated places. Bass, pickerel, pike, and lake trout abounded, the less abrupt watersheds favoring chains of lakes with sluggish, interconnecting streams having a high temperature in summer.

TWO VARIETIES OF SPECKLED TROUT

Many years ago I reached the conclusion that, because of the influences of their environment, the speckled trout of this region could be roughly divided into two local color varieties. One lived throughout the year close along the shore of the lake in comparatively shallow water, except when entering the tributary streams to spawn. The other lived continuously in the streams.

Comment is often heard about the great difference between the colors of the trout in the streams and those in the lake. While a color phase in some animals may be one of the characteristics differentiating species and subspecies, in the present case the light colors of the trout in Lake Superior and the dark, rich colors of those living in the streams are not so permanent. They are due solely to the character of the water in which the trout live at the time. Most of the Lake Superior streams take on a deep wine color, caused by the roots of conifers, and it will be found that when the large trout from Lake Superior enter the tribu-

tary streams to spawn they soon assume the colors of the native fish.

It is a well-established fact that speckled trout never spawn in Lake Superior, but, like the salmon, leave a great body of water to breed in the headwaters of spring-fed streams. These trout begin gathering at the mouths of spawning streams early in August, lingering for several weeks there or in the deeper pools in the lower reaches of the streams. At such times the fishermen formerly visited the pools and were assured of easy success. Eventually this practice nearly exterminated this fine game fish along the south shore of the lake.

FISHING IN SPAWNING STREAMS BAD

Years ago the decrease was noticed, but nevertheless the pools were visited by anglers in greater numbers than before, some fishermen taking in a single day a hundred pounds of sluggish and inactive fish, and often salting down the surplus for winter use. In this onslaught others reluctantly joined, for, since the fishing in the open waters became poorer each season, they yielded on the theory that if the end was approaching they might as well have a share in the final distribution.

The taking of these fish heavy with spawn must be stopped, for in principle it is the same as killing a bird on the nest, and leads to extermination. The termination of fishing on spawning beds and of the practice of setting gill nets along shore is necessary in order to save the speckled trout. Such nets are deadly to the larger fish. Establishment of hatcheries to restock depleted waters, greater protection of spawning beds, and other helpful measures of recent years must be carried out if the trout are to be maintained.

Including indentations, the shore line of Lake Superior totals about 1,000 miles, and in former years speckled trout could be found around all the rocky points, reefs, and gravel and boulder beds. Today the story is a different one, for they have become relatively few in numbers and are much scattered.

According to the written records of my family, covering 65 years, and to those of fellow anglers, the largest speckled trout taken on the south shore of Lake Superior prior to 1890 weighed 5¼ pounds; a much larger number varied from four to five pounds; and the minimum weight was about a pound. The immature trout do



TROUT FISHING IN SQUADS IS JOLLY SPORT

A gathering of Pittsburgh fishermen from Whitefish Camp angled in the pool at the foot of the Whitefish Falls, to which the trout are carried by spring freshets from the meadows above.

not enter the lake from the breeding streams until they weigh approximately one pound, and these fish do not breed until they are much larger.

Since 1900 speckled trout have been taken on the south shore that weighed more than 6½ pounds. The increased weight is doubtless due to the decreased number of trout in proportion to the food supply.

The smaller variety of trout that lives permanently in the streams spawns sometimes when less than six inches long. The maximum size of the resident brook trout is about equal to the minimum of the speckled trout living in the lake. It is therefore possible that in the same stream and in the same pool one may take two trout of the same size, one a permanent resident and the other a future inhabitant of Lake Superior that has not yet taken up its abode there.

Because of this difference in spawning habits and in the permanent home, it is essential to success in restocking the tributary streams of Lake Superior that the young of the proper kind be used. If young fish are reared from spawn of the stream fish and placed in the lake, they will either die or ascend the streams. Young of those belonging in the lake, when placed in streams, will eventually return to the lake.

The speckled trout along the north shore of Lake Superior are smaller than those on the south, except in the Nipigon River, in which trout have been caught that weighed more than 14 pounds. Ten pounds is nearer the limit now. This stream is large, rapid, and tumultuous compared with the other tributaries of Lake Superior. Because this river is under Government control and a daily limit is prescribed, the waters still furnish reasonably good fishing.

The hooks used by my ancestral fisherman were long and slender, with the point slightly turned to one side. Several differently colored feathers were fastened well up on the shank, and almost invariably a narrow strip of red flannel about an inch long, or a piece of similarly colored yarn, was added. Beneath this there was room for one or two large angleworms. In those days the use of live bait, especially angleworms, was regarded as sportsmanlike, and was apparently justifiable for fish habitually lying deep below the surface on a rocky bottom. To hook these big fellows was only an incident in the long, hard contest with a slender rod.

Every spring, while the angleworms were still near the surface, small boys were engaged to dig an ample supply in the vicinity of Pittsburgh. These were taken in a two-gallon can to the Lake Superior region, where they were placed in a large wooden box filled with black earth and protected by lock and key against a too-miscellaneous use. The angleworm was not to be found anywhere along the entire lake shore or in adjoining territory. Toward the close of each season, the remainder, if any, were distributed among eager applicants, and finally found an end within the gullets of equally eager trout.

This apparently harmless earthworm became a miniature serpent of dissension once at the Sault, when my grandfather gave his surplus to an elder of a village church with directions to apportion the supply equally among his associates. Some time later he received word that an angry dispute had arisen over the distribution of the worms.

THE ANCIENT FISHERMAN'S ANGLEWORMS SPLIT A CHURCH

It had led to the secession of a part of the congregation and the building of a rival edifice. This ancient fisherman was never able to determine to his satisfaction whether he was to be blamed for such a breach or was to be congratulated on having brought about the establishment of two churches where before there had been only one.

At the end of the fishing season in 1878, on receiving a larger remnant of angleworms than usual, I planted them in a large yard near the hotel in Marquette, with the hope that in a short time the local supply would meet future demands. By



LAKE HERRING SERVE UTILITARIAN
PURPOSES

These fish are the main food supply of the lake trout and of the herring gulls. Great quantities of them are taken each fall by Marquette fishermen, who from this added source are able to eke out a livelihood.

the end of three years they had become abundant in this little preserve.

Some were then taken to Whitefish Lake and placed in rich, deep soil near old Jack's cabin. These grew to extraordinary size and far exceeded in lustiness their Pennsylvania progenitors. From this locality they spread to the headwaters of near-by streams, down which they were carried each spring, until most of that district was populated by them.

Meanwhile Marquette had become a systematic point of distribution, and for some years the angleworm has been found scattered along most of the south shore and around both ends of Lake Superior. They progressed, also, along the north shore, and some years ago I learned that they were absent from only about 150 miles in the middle of this region. The gap will, no doubt, be soon filled, if this has not already been accomplished. If the fly fishermen are no longer interested in the angleworm, the history of its naturalization in this region may prove of interest to the scientist.

The robin, however, is the chief beneficiary, for these worms constitute the main part of its diet in May and June, before the coming of the berries, and compose almost the sole food of the first brood.

Moreover, in the last decade it has been noticed that the woodcock, which once stopped but briefly on its migratory flight, now lingers for weeks in the alder thickets near the streams where it can always find a bountiful food supply. The gardener, too, has found a friend in this little borer, for it assists in the breaking up and enrichment of the surface soil, its casts contributing much toward the quality and fruitfulness of the garden patch.

That such an agile fish as the trout may become the victim of an unusual enemy was shown in an instance that occurred many years ago.

GARTER SNAKES CATCH TROUT

In the spring of 1879, when fishing for trout with a companion in a small spring-fed stream near Ithaca, New York, I saw a garter snake swimming along the surface holding a six-inch trout that was struggling to escape from its jaws.

By the use of our rods we lifted the snake to the shore, and my companion transferred the fish to his creel with the remark that "Every little thing helps."

A few minutes later another garter snake appeared holding an even larger trout. He was dispossessed and then destroyed, for such is the usual way of man defending his assumed exclusive right to the bounties of Nature.

It was a surprise to me to find these snakes, which pass so much of their lives on the land, so expert in capturing fish. It was evident that they and their kind were stripping the stream of trout. They represented a peril previously unknown to us, which must seriously affect the number of fish in streams infested by them.

In 1872, when twelve years old, I had my first introduction to the lake trout. A report was brought to Marquette by a lumber schooner, which had been becalmed for a while in the vicinity of Stannard Rock, a metamorphic reef lying a few feet below the surface some 45 miles northeast of the town, that the waters about the reef were teeming with immense schools of lake trout. It was said that the fish could be caught by simply casting a trolling spoon overboard, the fish making such a rush for anything that looked like food that one could imagine there was a contest to see which one might be caught first.

The enterprising captain of a local excursion steamer thereupon advertised an expe-

dition to that vicinity, and some 75 persons, including women and children, departed for this anglers' paradise under bright skies and unruffled waters. At noon the steamer approached the reef cautiously, and anchored in about 30 feet of water.

Soon 10 boats were lowered, each carrying from two to five expectant fishermen with trolling lines trailing behind. In a few minutes there was a rush of eager fish such as my youthful mind had never before contemplated.

As the boats circled about the reef, the long lines, becoming crossed by the struggles of the larger fish, were entangled, while the continual flapping of the captured fish in the boats caused the women and children to shriek in triumph or dismay. Several times I hooked a fish weighing more than 20 pounds and was able to lift it from the water only by the aid of stronger arms.

Once a spoon that became detached was cast overboard and a near-by fish bolted it and went off in triumph! In several instances tin-tipped oar blades were seized, so anxious were the fish to try anything having a resemblance to living prey.

In less than three hours about 1,000 fish were taken, averaging 10 pounds each, and then this riot of destruction came to an end. It finally became apparent to all that it would be difficult to give away five tons of trout among their friends and neighbors.

The results of this expedition soon reached the ears of the local fishermen, and for several succeeding seasons immense catches were made at that reef. Now a towering lighthouse surmounts the rock, a warning to the mariner and a monument to the myriads of fish that have long since passed away (see illustration, page 382).

A HUGE CATCH OF LAKE TROUT

At one time the lake trout were in little demand, for the whitefish dominated the western markets; yet even then, with a few nets set, the annual catch of lake trout approached 3,000,000 pounds, so abundant were they everywhere in Lake Superior. This species has held its numbers better than any of the other commercial fishes in this lake, the take for 1926 having totaled 2,506,492 pounds. The fishermen of Michigan, Wisconsin, Minnesota, and western Ontario now use sailboats, launches, and tugs for gathering the daily catch.

Prior to 1885 the fishermen made their catches of lake trout and whitefish in Lake Superior in pound nets set in shallow bays. As the fishing became more intense, the supply of fish decreased and the pounds gave way to gill nets which are now set from 10 to 20 miles offshore in from 150 to 400 feet of water. The lake trout caught at such depths vary from 3 to 65 pounds in weight. Late in summer and in fall many lake trout are caught by trolling.

Larger steamers collect the fish taken in the more remote localities. Notwithstanding such a combination of methods, the present total catch does not equal that so readily taken 40 years ago. It is made, too, at a proportionately greater expense.

The whitefish, especially those of Lake Superior, have been generally esteemed the most delicious of all fresh-water species. When the nets were few and far apart and the methods of transportation and distribution undeveloped, millions of pounds were taken each season, while today, with a hundred times greater number of nets, a much higher market price, and means of rapid distribution, only a fraction of the former amount is caught.

The following figures tell the story: Whitefish, 1885, 8,000,000 pounds; 1926, 184,757 pounds. Thus it is apparent that this excellent fish is commercially almost



THIS STRING OF SPECKLED TROUT AVERAGE $4\frac{1}{2}$ POUNDS

Before 1885 such catches were not unusual along the south shore of Lake Superior. The long-time practice of fishing about the mouths of spawning streams in late August and the increase of fishermen account for their present limitation in size and numbers (see text, page 381).

extinct, but there is a sufficient remnant left, if carefully protected, to insure restoration in such favorable waters.

Anglers have found that they may catch whitefish in harbors and other shallow waters at times about Lake Superior by a small ball of dough on a very small hook sunk to the bottom. The whitefish weigh



TO FISH FOR PICKEREL, CUT A HOLE IN THE ICE

This scene shows Whitefish Lake from the mouth of the slough. Winter has shrouded the whole region in spotless white, and the woodsman who knows the habits of wild creatures can read interesting stories in the tracks on the snow.

from three to 20 pounds, the larger ones being taken only in gill nets.

The herring catch for 1885 totaled 300,000 pounds and that for 1918, 8,000,000 pounds. These figures show how this small and inferior species exchanged places with the whitefish in that period. In 1926 the catch of herring had dropped to 387,091 pounds. This rapid decrease of the herring may threaten the future of the lake trout, for herring are an important part of the food supply of that fish.

Only by thoroughly enforced conservation measures can the game and commercial fishes of this greatest of fresh-water lakes be perpetuated. The angler and the commercial fisherman, together with many of the public, are interested in maintaining a bountiful supply of fish, high in quality and reasonable in price. This justifies their active support of the efforts now being made to rehabilitate the fisheries of the Great Lakes.

It has long been recognized that the lack of cooperation among the States and the Canadian Provinces bordering on the Great Lakes accounts for the unfortunate situation. With each acting separately and each naturally disposed to have laws equally liberal toward its own fishermen, it follows that the State or Province spending the least money in fish culture, or having the most improvident regulations and the least efficient system of enforcement sets the pace for the others.

Meanwhile the governments of each country must sit idly by, because they lack any authorized jurisdiction over fisheries in international waters in which the respective citizens of the States and Provinces have a common interest.

CANADA FAVORS A FISHERIES TREATY

It was to meet this unfortunate situation that the United States and Great Britain negotiated and ratified a boundary-waters fishery treaty, but the failure of the United States House of Representatives to pass an enabling act in 1914 on account of minor differences among fishermen in southern Michigan and jealousy over the proposed withdrawal of local regulations, has postponed indefinitely the operation of this beneficial agreement.

It is understood that Canada is still willing to see the treaty revived by the passage of appropriate legislation, or a new one negotiated if our country will make a

move in this direction. Meanwhile the authorities of the Lake States and Canada are trying to bring about a standardization of the laws of the two countries covering commercial fishing in these waters. By such coordination of authority and cooperation the problem can readily be solved. It is not a local question in any sense, but one that is interstate, national, and international in scope.

That such a solution of this problem is reasonable and not speculative has already been established by the Migratory Bird Treaty, under the recent operation of which our wild fowl are protected and the more valuable of the insectivorous birds are permanently safeguarded in behalf of the agricultural interests of both nations.

RAINBOW NEWCOMER IMPERIL THE SPECKLED TROUT

After frequent plantings, the rainbow trout have become permanently established in Lake Superior. During the spawning, in May, they are to be found in considerable numbers in most of the streams entering the lake.

As an admirer of the speckled trout, I have wondered just what effect these alien fish would have upon its abundance and perpetuation, and fear for the result. The maintenance of all fish naturally depends upon the food supply. This seems imperiled by the presence of the newcomers, which, being larger, will necessarily cause a greater depletion of the water life.

It is not unusual in spring to find streams heretofore occupied exclusively by brook trout crowded with rainbow trout, many of which exceed 10 pounds in weight. Even the smaller creeks harboring the immature speckled trout have been sought by these large fish.

Were the streams invaded only during the spawning season, the situation would not be so bad, but the young of the introduced species remain a long time in the streams before seeking Lake Superior and thus become year-long competitors for the food of the brook trout. Not only this, but they raid the brook-trout spawning beds.

In the larger streams the influx of the rainbow trout resembles the seasonal migration of the salmon. They come by thousands in a concerted movement, unlike the speckled trout of the lake, which gather gradually during a period of three or four weeks each fall.



THE AUTHOR'S FIRST FISHING PICTURE, 1886, SHOWS THE LANDING OF A FOUR-POUND SPECKLED TROUT

A rocky islet, amid beautiful scenery, near Sauk's Head, Lake Superior, was once famous for the abundance of large trout about it. This was the scene of the present picture, when after a fight lasting many minutes the prey was brought to the landing net with a very light fly-rod.

Some information bearing on the state of the foregoing problem at that time is presented in the 1928 report of the Michigan Conservation Commission, which, after a careful inquiry, estimates the relative number of brook trout taken during the preceding year at 85 per cent, the number of rainbow trout at 13 per cent, and the number of German brown trout at 2 per cent.

The rainbow trout, a native of the Pacific Coast, is a more determined fighter than the speckled trout, frequently leaping from the water in its efforts to escape from the hook much in the manner of the black bass. This newcomer from the west, however, is much less beautiful than our native species and has a poorer flavor.

They have come to stay in these waters at the invitation of our citizens and may help replenish the depleted supply of fish in Lake Superior with a game fish that may prove its value. It is certain, however, that old-time fishermen will look askance upon any fish displacing or subordinating the famous speckled trout in waters in which

they have heretofore denied the existence of any worthy rival or possible successor.

About 1900, increasing numbers of rainbow trout were taken in the Sault Sainte Marie rapids, and this became famous throughout the country as a fishing ground. Unfortunately, when a dam was built at the outlet of Lake Superior, to control the water for use in the locks and to generate electric power, these historic rapids were nearly destroyed.

FISH OF PONDS, LAKES, AND STREAMS

Although my interest was confined almost entirely to the speckled trout of Lake Superior and adjacent waters, some reference should be made to other species of fishes found in the many streams and smaller bodies of water along the south shore of the great lake. In these warmer waters a few miles inland the pickerel appears to be the dominant species, associated with perch, blue-gills, sunfish, suckers, and bullheads. In occasional deeper lakes may be found small-mouthed bass and land-locked lake trout.



TOHQUAMENON FALLS, IN NORTHERN MICHIGAN, INVITE SPORTSMEN TO TRY FOR CHAMPION OF THE FINNY TRIBE

East of Marquette and near Newberry is a great hunting and fishing area. In recent years the Michigan Conservation Commission has greatly improved the angling throughout the State, and wild game laws have preserved the deer.

Streams flowing from these warm lakes into Lake Superior seldom contain trout, for their high temperatures render them unsuitable for these lovers of cold water. Now and then a cold, spring-fed lake is inhabited by very dark-colored speckled trout, which sometimes exceed four pounds in weight. These trout are of a more sluggish disposition than those in the streams.

PICKEREL ARE GLUTTONS

With the opening up of the country, and especially with the advent of automobile tourists, the pickerel has been elevated to the list of much-sought game fish. It affords both sport and food to camping parties in sections in which in earlier days it was seldom taken by local people. The smaller fry mentioned as inhabiting these waters give joy to the juvenile members of outing parties.

The pickerel has a sharklike voracity, and I have known these fish to feed day after day on a brood of young wood ducks until they were all gone. Twice I found

a dead pickerel floating on the surface, with the head of a sucker equaling its own weight so firmly held in its jaws that it had died trying to free itself from its oversized mouthful.

Because of their temperature, Georgian Bay, along the north shore of Lake Huron, and the many lakes and streams draining into it from the north, including those of the Wanapitei district, are marked by the absence of speckled trout. These waters, however, like the warm waters along the south shore of Lake Superior, are occupied by black bass, pike, pickerel, and other fishes not common to trout streams.

Both in the deeper small lakes along the south shore of Lake Superior and in those north of Georgian Bay, Lake Huron, occur what may be termed land-locked representatives of the lake trout. These are sometimes locally termed salmon trout.

In some of the waters lying north of Georgian Bay, the temperature and other conditions apparently are suitable for speckled trout, but the occupation of the waters in that area by bass, pike, and

pickerel, all voracious feeders on trout, makes it impossible for these desirable fish to exist there. It was a surprise to me to learn that Long Lake, a deep, narrow lake crossing St. Ignace Island, is inhabited by pickerel, and not by lake trout, a matter of distribution difficult to understand.

The question has often been asked: "How long do fish live?"

Size and weight are not reliable factors because these are often influenced by environment or the food supply. Scientists have learned, however, that the age of a fish can be determined by microscopic study of its scales, each year's growth being indicated by rings, just as the age of a tree may be known by its growth rings. No matter how small the scale of a fish, the telltale rings reveal its age.

For many years I had been familiar with the deplorable decrease of migratory food fishes in the boundary waters of the Great Lakes and on both sea coasts, because of the uncontrolled and destructive methods of the fishermen. While a member of Congress in 1905, I tried to initiate some action that might correct this situation and help perpetuate a great natural resource threatened with destruction.

THE AUTHOR INTRODUCES FISH PROTECTIONS

For this purpose I prepared and introduced in Congress two bills: 1st, H. R. 19164, "A bill to protect certain migratory fish in the public waters of the United States," and, 2nd, H. R. 19165, "A bill to protect the food fishes in certain interstate public waters of the United States. (See Chapter XXI, part 2, for copies of these bills.)

These bills, which were the first of their kind, were introduced only a few days before I retired from Congress, and no action was taken on them at the time. Later Congressman Linthicum, of Maryland, re-introduced these measures, with the support of

the American Fisheries Society and like organizations.

Still later, Herbert Hoover, as Secretary of Commerce, called a conference of commercial fishermen and conservationists which met in Washington, June 16, 1921, "to consider the control and prevention of water pollution and the protection of anadromous and shore fishes and other aquatic forms."

COMMERCIAL FISHERMEN BALK PROTECTION

Federal control of migratory fishes was discussed, and I took an active part. However, because of the united opposition of the commercial fishermen, no action was taken favoring this or any other policy that would help the situation.

On May 22, 1925, the Fisheries Conservation Congress was called by Secretary Hoover "for saving certain of our Atlantic coast fisheries from final destruction." Again the conference ended in the passing of resolutions similar in futility to those of the previous conference.

To indicate the opposition of commercial fishermen to any real control of their activities in the face of an acknowledged dangerous decrease of certain fishes the final resolution of the conference is given here. "*Resolved*, That in considering means of improving fishing conditions we particularly endorse and recommend any and every action that may be taken to subserve the welfare, comfort, and material success of the commercial fishermen."

But any form of Federal supervision was ignored. Thus the situation stands at present with the States in exclusive and full control of fish in interstate and international waters. This, too, in blind disregard of the lessons taught by the Federal regulation of migratory birds, where previously wasteful methods and lack of cooperation by the several States had threatened the extinction of many of our most valuable feathered migrants.

CHAPTER XXI

Permanent Wilderness Camps

IN THE United States and Canada there are probably more sportsmen than in all the rest of the world combined. State hunting and fishing licenses issued annually now number about 7,000,000; and this does not include the sportsmen in those States that lack a license system and other classes who are either not required to take out a license or who ignore the law.

While it is true that we find many of the leading sportsmen of the world in England, Germany, France, and Austria, yet the scarcity of game or the private ownership of hunting territory and severely restrictive laws have limited hunting among the mass of the people in those countries.

In North America, from its first occupation by Europeans, hunting has been free to all, and the game fields continue to invite millions of hunters. In addition to large sums derived from licenses, many States and the Federal Government appropriate considerable money for the protection and increase of game animals, birds, and fish and it follows that people are free to use the rod and gun under reasonable restrictions.

AMERICAN INTEREST IN WILD LIFE

The extent of the activities of the American sportsmen is well indicated by the large number of private hunting clubs and camps, which involve an investment of a large sum in land and improvements and by the hundreds of associations formed to aid in the preservation of wild life. Such general interest in wild life prevails nowhere else. It is evidence of the wide participation of our citizens in outdoor recreation.

The outdoor habit has meant much in the promotion of the health and pleasures of the average man. In the World War our soldiers showed themselves superior in marksmanship, endurance, and self-reliance, largely as a result of the life so many of them had led in the open.

As a necessary incident of their out-of-door interests, these frequenters of the wilderness have often established in favored locations permanent camps to which they have returned year after year. Half a century ago, when game was more generally distributed, most of the sportsmen hunted near home, or when they went some distance

for large game, the shooting season opened early and many of them occupied tents and other temporary quarters.

In the colder parts of this country, with the big game season now beginning about the time of the first snowfall or the coming of the colder weather, many comfortable camps have been built by sportsmen, and log cabins have been put up by the hunters and guides. The change in conditions that has caused the establishment of these camps will be recalled by many people.

WHITEFISH LAKE CAMP

My own experience in this particular is a common one. I first built a little bark-roofed camp below Whitefish Lake, where I had been guided by Jack La Pete. Later came a substantial log cabin, with two bedrooms and a combined living and dining room. A kitchen was unnecessary, for the necessary cooking for many years was done out-of-doors.

The comparative comforts of this simple establishment led to its being visited in summer by various members of the family, both young and old. It is interesting to note that up to the present five generations have occupied it. This increased use suggested improvements, and in the course of time, but by easy stages, came the erection of a house of 10 rooms, barns, poultry houses, an ice house, and nearby an attractive log cabin for the caretakers.

In the hardwood forest surrounding camp was a maple-sugar plant, which, as a result of gradual improvements, now produces 500 gallons of syrup annually. A small sawmill made available numerous kinds of timber for various improvements. The camp garden, which originally supplied only potatoes, became an interesting and enjoyable feature of camp life.

Vegetables of 27 varieties were successfully raised, although the corn and tomatoes were sometimes nipped by early frosts. Besides these, there were strawberries, raspberries, blackberries, currants and gooseberries, a few cherries, and a considerable orchard of apples. A rock and water garden indicated that the eye as well as the stomach had received attention.



TWO BUCKS WERE BROUGHT IN ON A JUMPER

The transformation of the forest by its first mantle of white always gave a peculiar exhilaration to hunts. The friends here shown from left to right are Charles Hebard, Philadelphia; Dean Williams of the Cathedral at Marquette, afterward Bishop of northern Michigan, and always a keen sportsman; and B. F. Charlton of Marquette.

Now it may be asked whether the urban character of these improvements had not converted the old hunting camp into a gathering place for the more sophisticated and whether the glory of the former simple surroundings had not lost their charm.

The fact that in 1927 it became necessary to erect a nine-foot fence around the garden in order to keep out the deer, which appreciated the ever-increasing variety of vegetables, indicates the wild surroundings of this former retreat.

Because of the presence of cut-over lands, with their second growth, ruffed grouse have never been more numerous than in later years, until they were affected in 1925 by some form of disease. Horned owls are numerous, and their notes are a characteristic part of the voices of the wilderness. Rabbits, too, prefer the second growth, as

do the beavers, and these animals appear close to the camp.

The adjacent lake and the outlet stream, flowing by the camp, contain the usual number of fish, and mink and raccoons may be seen investigating these waters. Muskrat houses are numerous on the banks of the stream or in the form of oval lodges in the marshes at ends of the lake. Wolves howl and coyotes bark in the adjacent swamps, to the consternation of some visitors, and black bears occasionally prowl about the sugar camp.

That such primitive conditions should prevail after 50 years of occupancy may seem unusual, but it is the case with many camps scattered throughout the United States and Canada. Such places are increasing in number, because remote cut-over lands containing streams and lakes can

often be acquired for a few dollars an acre. They are more attractive than if they were located in a dense and gloomy forest. In time these cut-over lands, when properly located, increase greatly in value, though this result is a secondary consideration to the nature-lovers who own them.

At our camp, besides the register, some one started a camp log, wherein visitors or members of the family recorded their impressions or described events of more than passing interest.

A number of my professional friends from Pittsburgh who were practicing law used to spend a few weeks each summer at our camp. Recently, on looking over the camp log, I thought it worth while to copy the following entries made therein by the historian and poet of the party.

THE CAMP LOG FOR 1894

To some these narratives may seem over-jocular, but in reality they indicate the mood induced by the wilderness, when all cares are cast aside, and genuine relaxation and good fellowship rewards those seeking Nature's realm.

At the time of this visit the place was known as "Ye Camp of Ye Fyddling Cat," because a big pine opposite the clearing, the top of which, silhouetted against the sky, bore a grotesque resemblance to a huge cat with a fiddle. A typical entry follows:

"Having been duly elected by unanimous vote as the only absolutely truthful man in the party, the historian now proceeds to record a veracious and faithful account of the doings of those persons who came into this camp upon the afternoon of July 6, 1894. Names are given for the purpose of identification and therefore they are entered here. We are Judge S. A. McClung, Samuel Urias Trent, William H. McClung, Edwin Zug Smith, Samuel McClay, Edwin W. Smith, with George Shiras, 3d, as host.

"We reached Marquette from Pittsburgh on the night of July 5, in the rain, and were met at the station by Shiras. The next day broke gloriously, with a crisp freshness to the air; the water of the bay and the lake beyond sparkled in the sunshine. We thought that this was enough for our journey, even if there were not other enjoyments in store for us.

"At the afternoon train we met Jake Brown, who was already famous from the stories told us by Shiras. We had hoped to learn the truth from him, but Jake is ever

faithful and when he catches the 'tip' he corroborates everything Shiras has said, and goes one better.

"At Deerton we were astounded at the boxes and packages which were unloaded from the cars for our use, and thought that it would be impossible for us to pack them to the camp. We were relieved, for through the bushes came the flapping ears and body of the most gaunt mule we had ever seen. He was dragging a jumper. Upon this were piled the innumerable things which were to be taken.

"Could he move it? With measured movements he brought himself into action and walked off with the load. He is 'slow but he gets there just the same.' We learned to respect this unassuming mule.

"We noticed many noble and magnificent traits in him which led the Judge to call him by the name of Urias. The same name is borne by one of us whom we hold in the highest esteem. The name was not conferred in derision of either of them, but in warmest feeling for both. It was not given at font or with baptismal rite. We do not know that this mule has any other name, but to us he will ever be Urias.

"The sunlight came slanting through the trees as we followed the trail, and the freedom of the woods was in our hearts. On our way we startled a brood of partridges from the path. We reached the camp of 'Ye Fyddling Cat' an hour and twelve minutes after we left Deerton. We found Samson Noll and John Hammer waiting for us and they gave us hearty greeting.

"The first fish was caught at the dam just after we got in, McClay getting a grass pike.

POETRY IN HAM AND EGGS

"The historian has noticed that in these chronicles mention is made of the ham and eggs of Samson, the cook. No one who has eaten them as we did, after a long walk, will wonder that they are preserved in history. They should be sung in a noble poem.

"After supper we went through the woods to the house boat on the lake, and across the water saw our first deer. Some of us had never seen a wild deer in the woods. Jake, who paddled up the river, said he had seen four on his way up.

"Back to the cabin, a fire was started, and around it we sat and smoked and sang (if we may call it thus) and talked till bedtime. It is but right that we should pause here to speak of Shiras' musical powers. We



A HUNTING PARTY AT THE OLD CAMP ENJOYED ROUGHING IT

By 1884, when this photograph was taken, a roof had been built over the table in front of original lean-to. The men in the party shown here, from left to right, are: Fred Bawgam, seated; Samson Noll, facing left; Jack La Pete—all guides; and young Brassey, afterward Lord Brassey; McLean, stroke oarsman in the Oxford, England, crew; Peter White and Charley, an Indian guide.

had known some of his accomplishments, but not that he plays upon a wind instrument. The limitations of the mechanism hamper him. Were there more keys and tubes he could, no doubt, perform the most difficult music with a certain effect.

"We would not dictate, but merely suggest, that he learn the whole of a tune. The long-drawn-out notes are peculiarly sweet and touching. We desired him to climb the pine and play a duet with the cat, but he firmly declined.

"*July 7.*—The next morning we awoke and heard the soft munching of the grass by Urias, the mule, at the back door. He came out in the early morning with a second load. For breakfast we had, among other delicious things, the fish which we had caught. Again were we inspired with ardent admiration for Samson, the cook.

THE FISH WOULDN'T HANG ON

"This day we passed at the house boat, taking our lunch with us. We did not meet with the success in fishing that our number would call for. However, we did not consider this our fault. Each one of us felt that we had the ability to land any fish that would take hold with a firm grasp and hold on with tenacity.

"The historian had caught a number of perch, not large, but of excellent quality, which, after some argument by some ignorant persons, were put back in the water. After learning that they were good, he made a vow that he would not go out again without Jake or Shiras, who might have a proper knowledge of the excellence of game or fish captured by him.

"*July 8.*—We went to Laughing White Fish Falls. After following the trail nearly there, we lost it and then broke through the bushes for the river. We paused a moment to pay a tribute to W. H. McC. as a woodsman. He lost us. We have learned that he can lead a party of guides and greenhorns away from the trail quicker and farther than anybody else. We fished the stream, under the logs and stones and in the pools, and then had lunch in the very spray of the beautiful falls. Afternoon we fished again, and then went home with 27 trout.

"A record is made here for specific purposes that the Judge did not fish, and also that Trent stayed at home with a sprained ankle, acquired in some unaccountable way in chopping down a fine tree. Shiras and E. Z. went home by the creek and the lower

trail. The rest of us climbed up the cedar to the top of the falls and came home that way. The Judge has displayed remarkable agility. He climbed to the top of the falls while we were fishing, but shinned up the bare cedar pole and did not discover the notches cut in it until he started down.

"As we came home we stopped at Jack La Pete's cabin and got some maple sugar. McClay had some doubt about the cleanliness of the sweet stuff, but Jake assured him that it was all right, since he had seen Jack strain it through an old blanket. For supper we had the 'speckled trouts,' as McClay called them, broiled deliciously.

"*July 9.*—This day was passed quietly in camp. Trent and E. Z. explored the river below the dam for half a mile in a boat. From their account, they passed through many perils and difficulties. Upon this day it was clearly proved that E. Z. cannot swim 15 feet, as he had proudly claimed, unless perhaps perpendicularly.

"This afternoon A. O. Jopling came into camp, bringing with him the newspapers, with their story of the strikes and riots all over the country, which in our quietude we had almost forgotten. It was this strike that gave us Jake Brown, who was booked for Henry Lake, Idaho, and was awaiting the opening of railroad traffic.

"*July 10.*—Tuesday was also passed peacefully in camp, for it was very hot. We fished the stream and caught all the fish or scared them up to the lake. We fished in single boats, and in flotillas. Trent attempted to 'trolley' the lake for pickerel in *Certain Death*, but met with no success. We looked for him to catch an electric fish certainly, but he did not.

THE HOST TELLS YARNS

"Every night we have sat around the blazing fire and listened to Shiras' yarns, as the flames leaped up and the sparks went dancing up into the trees.

"We all have had some difficulty in knowing how to dress for bed. Every few minutes during the evening Shiras would look at the thermometer and report rapid falling. Until we had been in camp three days, the process of undressing was rather the putting on of more clothes. Trent the first night kept on his tie for warmth.

"The historian was compelled to get up and take off his woolen socks to prevent suffocation. We know Shiras now; he can't fool us any more. There is no more danger



NOVEMBER CLOTHED THE OLD LOG CABIN IN SNOW

In summer it was a delightfully airy abode. Winter made it snug and draughtless by a heavy covering of white. In either season it was comfortable, a place where a wilderness lover could forget the cares of the world.

from frigidity here than at home. We have learned that the reason Shiras wears his stockings to bed is that no cot is long enough for him, and his feet stick out.

"Shiras has photographed us in every way, in havelocks and on the roof of the cabin, together and separately, but we are always ready to humor him; it doesn't hurt us. He put three of us into a picture below the falls, each with a dead fish at the end of the line, straight and still. He will tell his friends that we did not know any better, but we did, and this proves it. E. Z. wanted to be taken as hanged. We did not know why, unless he expected to meet that end some day and wanted to know beforehand how he would look.

A REALISTIC HANGING

"We led him to the swing. He insisted on fixing the rope himself. He put it under his arms and then, to make the whole thing appear more natural, around his neck. We told him it would not do; he said go ahead. We gently raised him, and when we had lifted him from his feet, the rope tightened around his neck, when the box upon which

he stood collapsed and we let him down with a 'dull thud.' He is preserved in the picture, however, with the rope dangling above him. We trust there is no prophecy in this.

"W. H. McClung is now 'Natty Bumpo,' having gained his title on Monday. Beyond this we say nothing, except that upon that evening we had a mighty good mutton stew. He also holds the medal for the greatest number of fish caught; but Trent, who comes next, says that Billy is one of those fishermen who count their fish, big and little, and that he, Trent, has caught at least a thousand that he does not now remember about.

"McClay caught the most trout and the only two pickerel. He is now 'Pickerel Sam.' He has urgently requested the historian to enter nothing derogatory to his moral character. The historian has complied with his request.

"*July 11.*—We leave camp this afternoon. Mr. Jopling went out to catch the afternoon train. We are all glad indeed to have had him with us for the two days of his stay.

"Shiras, who has been with us, knows how we have enjoyed these days, and we wish



THE HOUSE BOAT WAS A SUMMER GATHERING PLACE ON WHITEFISH LAKE

The author's old Long Island Sound hunting skiff *Certain Death* is seen here in use with sails spread. At the right-hand corner of the deck is Sig'n Trentanove, a famous Italian sculptor, and next to him, seated, is Don M. Dickinson of Detroit, Postmaster General under Cleveland.

to express our sincerest appreciation of the kind hospitality which we have received at the 'Camp of the Fiddling Cat.'

"EDWIN W. SMITH.

"Without attesting to the truthfulness of the above,

"S. A. McCLUNG,
"SAMUEL McCLAY,
"S. U. TRENT,
"WM. H. McCLUNG,
"EDWIN Z. SMITH."

THE CAMP LOG FOR 1900

"July 14, 1900.

"The rest of us got into camp Saturday, July 14, and what happened between that date and the 16th cannot be recorded. Shields has gone home and Patterson will neither write the log nor give the historian the facts with such distinctness as will allow any arrangement. They seem to have fussed about camp, taken their meals with regularity, and slept some at night; beyond this, nothing.

"July 17.—In the morning it rained, but cleared about noon, and after lunch we all

went to the house boat, fished the lake, had supper, and then came home. At 11 o'clock Shields went out with John to see the deer under the light. He spent the night on the house boat and got up early, coming back to camp with an air of a 'game sport,' and as if he had done something, which he hadn't.

"July 18.—Shiras has every year promised to take us to Howes Lake. This year we went. We were told that it was two miles by an easy trail. We started at 10 o'clock; passed the 'burning' at half past 10; and after that nobody knew where we were until 12, when we reached the West Branch of something and had lunch at an old hunter's camp. It is fortunate for us that we carried with us something to eat.

"We started again, with renewed vigor, for the lake, farther away from it now than when we left the camp in the morning. We got there safely about 2 o'clock. It is a beautiful place, but it seemed to us that there was a shadow of sadness upon it. The cabin stood deserted among the gorgeous flowers, foxgloves and sweet williams, which were growing with luxuriant wildness



FROZEN IN, THE HOUSE BOAT BECAME A STATIONARY CABIN

In 1894, after the permanent camp was completed, this craft was built on Whitefish Lake. It afforded comfortable quarters for hunting or fishing parties. In the photograph John Hammer is shown departing with his toboggan after he and the author had passed Thanksgiving there.

through the clearing. The splendid sunshine glistened on the rippling water which murmured at our feet as we sat and smoked under the pines.

"At 4 o'clock we started home. How we got there can never be told, but at 5 o'clock we had put the cedar swamp between us and home. John finally said the camp was due east, and we would not mind the 'd—— trails,' but go by the compass.

"We struck straight into the swamp, splashed through mud and water, climbed over roots and logs. Patterson came down hard; every one over shoetop. Shields wore a glad smile, having flowers in one hand, his camera in the other, yachting cap on his head. We struck the wagon road down toward the track somewhere and got home at 6 o'clock.

ODD FOOTWEAR PUZZLING

"*July 19.*—We had an early breakfast, not too early, and started for the meadows above the falls to fish for trout. Remembering his experience of yesterday, Shields insisted on wearing Shiras' gum boots. Shiras wore, today and yesterday, Patterson's shoes with three socks and a havelock on each foot. We do not know but suppose that it is all right. We went by boat to Jack's camp and then by trail.

"The 'art and mystery' of woodcraft ceaselessly astonish us. As we went along we heard the roar of the falls, and soon came to the trail where a tree is plainly marked, 'To the Falls.' John broke a sapling across our path and said we could not miss that and on our way back from fishing we would turn in.

"After a half hour's walk we heard the falls again and soon came out on the brink of the river. We had not intended to go there. We stayed there a while and then started for the meadows. We struck the main trail at the broken sapling. We had not intended to go there. We had gone in one trail and out on another. Shiras goes by blazes, John by compass. We all got lost. They always know where they are, but what is the use of knowing where you are in the 'solemn woods' if you can't go where you want to.

"We had lunch at the spring where we had the fried trout for lunch last year. When we reached the river, we had to cross on a log. Two of us fell in. Shiras has more fun with us on logs than anywhere else. We would all have fallen in if John had not

got us a pole. Shiras, Patterson, John, and the Doctor caught fish, but only a few. It was a cloudy, warm day, and we ought to have caught fish if they were there. There is a new lumber camp in the vicinity, and Shiras says the lumbermen have caught all the fish. This was a consolation.

"*July 20.*—This morning Shields, Shiras, and Smith explored the lower river, passing over rocks and rapids, and in the afternoon the Doctor, Patterson, and Shields went down. The lower river is very beautiful, and it is too bad that there is not often enough water to get down in the boats.

"*July 21.*—Shields left us at 11:45 for home. We passed the afternoon at camp, and went up to the house boat for supper. In the evening we went up to the blind before the sun went down, and saw some deer. After dark, we went up to the slough to get some flashlight pictures. Shiras, the Doctor, and John were in the first boat and Patterson and Smith were in the second. We paddled softly and, by a misunderstanding of directions, the second boat was behind.

"The first boat got within a few feet of a big buck and four does. It was an unusual chance for a good picture. But still the second boat was behind. Shiras made a few incidental remarks and then prepared to take the picture. At this point we should have looked for a brilliant flash that would have lighted up the whole lake. But there was no illumination, only a spark and a fizzle. Then the words of Shiras came over the water. 'What ungodly luck! That buck had a rocking chair on his head.'

LEFT TO PADDLE IN THE DARK

"Downstream, John held our boat until we all humped up on a log and scared a deer crossing the river. Then Shiras commanded, 'Cast off the boat and come on.' And there, in the darkness, Patterson and Smith were left. However, Patterson can paddle the river better in the dark than in the daytime, and we got safely home.

"*July 22.*—Shiras said we broke the record this morning by having the latest breakfast ever served in camp, and yet it was only 9 o'clock. We think he told us this to make us feel bad, but we don't. We swam, except Shiras. He does not like water. We went to the house boat. Shiras indicated that he wanted to go alone with John and get some pictures. He took the other boat, and took 'tea' with him. We are charitable and do not take offense, but he is being pun-

ished. It was his intention to leave us alone in the camp. It is now raining hard, and he is out in it somewhere. We think we shall go to bed and lock the door. But up from the river comes the bark of a wolf, so natural as to deceive nobody, and Shiras is here.

"July 23.—There was a white fog from Lake Superior—one of the two such fogs which come every year, but the sun has broken through and is shining warmly. Patterson and Shiras are playing for the croquet championship, and Shiras has won.

"At 11:45 lunch, and at 12:30 we break camp and leave for home.

"We append here a few aphorisms for the benefit of whomsoever it may concern:

"a. Wherever you are, the camp is always due east.

"b. Woodcraft is an art, not a science.

"c. N. B. except at the change of the moon.

"EDWIN W. SMITH."

"Approved:

"J. M. SHIELDS."

ON THE WAY TO WHITEFISH LAKE

By the Whitefish campers' cabin, looking eastward to the dam,
There's an Indian chieftain sitting, and he doesn't care a clam;
For the deer are in the pine woods, and the porcupine they call,
Take our pictures, Mr. Shiras, take our pictures one and all.

On the road to Whitefish Lake,
On the road that we would take,
Where the shade is flecked with sunshine,
And the rippling waters shake:

Oh, the woods we traveled through,
And the meadows wet with dew,
And the days we spent among you,
So long, and yet so few.

Send me somewhere west of Huron, when the trees are in the bud,
When the breathings of the summer fan the pulses of the blood;
For the sighing forests call me, and the lake puts up its cry,
Are the masts of men or commerce fairer vision to your eye?

Oh, the winds we traveled through,
And the lake that came to view;
Can't you hear the flashlights booming
From the cabin to the slough?

Oh, the woods we traveled through,
And the meadows wet with dew,
And the days we spent among you,
So long, and yet so few.—T. P.

THE CAMP LOG FOR 1903

"WHITEFISH LAKE, July, 1903.

"We took the freight train at 8 a. m. We met John Hammer at Deerton, with a horse we had never seen before and a buckboard. Judge Frazer rode out to camp on the wagon, giving as a reason that his feet were sore from walking around Marquette while waiting for the rest of us. It was a beautiful day and the walk through the woods was fine.

"We had a shortcake for lunch already noted in these annals. Not this particular shortcake, of course, but of like kind. We walked out to the spring in the afternoon, and went up to the lake at evening. We saw the white porcupine and, on the river and in the slough, saw or heard 13 deer. At least Shiras said we saw that many.

"There are some of us who believe that when a deer comes out to water and then goes back into the woods 13 times Shiras counts that as 13 deer. When we got back to the house we had a fire. We are going to have a fire every night, if we bankrupt the camp.

"17.—Rain all day. If we ever visit this camp again—and grant that we may—we are going to 'bust' that barometer the first thing. It has been behaving shamefully. These mechanical contrivances for the control of the weather are certainly not to be relied upon to produce the right results. We can sleep, and do. We can go to our meals, and do.

"18.—Cloudy morning. We fished this morning. Judge Evans and E. W. caught as fine lot of perch as ever were caught, likewise a pickerel. But these fish are not what you would call gamey fish. E. Z. sailed *Certain Death* up the lake.

"We surely must scuttle that boat. E. Z. has an uncontrollable desire to sail it. We do not believe that he knows how to sail and are always in doubt as to whether we should follow him with all the canoes or let him take his chances. He left his ship at the house boat and started to walk to camp. He had not appeared when we were through lunch.

"A storm was brewing. Shiras and John started out to find him, tooting the horn. He soon came rushing in through pouring



THE AUTHOR'S FAMILY CAMP TODAY SMILES WELCOME BEYOND THE SWIMMING POOL IN THE WHITEFISH RIVER

Here he invented flashlight photography of wild life and in the vicinity he took many of his best photographs. Between the two buildings at the extremes, flashlights of deer and other animals were obtained in the garden. Along the river front by day or by night pictures were procured of beavers, muskrats, minks, raccoons, and some deer.

rain, explaining that he was not lost, but had merely got off the trail three or four times and had to go back to the house boat and begin again. This explanation went for that once, but it will not go again.

"Shiras is an observer of coincidences. His perception of a coincidence is something marvelous. We had a heavy fog to-night. Why is it, if there are only two fogs on Whitefish Lake a year, do we always get them both?

"19.—More rain. Barometer steady or going down. We do not care which; we can see it rain without looking at that depressing instrument. The other heavy fog is on us. E. Z. and E. W. reach the house boat between the showers. It clears in the afternoon, and we have supper at the house boat. When we go to bed, it is clear and the stars are shining beautifully.

"20.—It is a fine day. The rain is over. The river is high, and gleaming in the sunlight. We fish a little from the dam. Judge Frazer takes his first lesson in paddling. He may learn in time. At noon Shiras, E. Z., and John Hammer leave camp to start upon their Canadian trip.

"Judge Evans said it had cleared just long enough to let Shiras get away. The Judge seems to think that Shiras fixed the

barometer. The rest of us do not. We record the facts, and the proper inferences can be drawn. Shiras seemed to have some question in his mind as to whether or not he should leave us. We assured him that we would do no harm. Barometer is falling. It will rain tomorrow.

"21.—It does rain. We do not go to Howe's camp. We do not go to the falls. We paddle on the river. We walk short distances in the woods. The sun breaks through the clouds, and the barometer is going up. We have an open fire in the evening. It is our last fire and there still seems to be some wood left.

"July 22.—The Judge of No. 3 calls our attention to another remarkable coincidence. In 1899 we went out on July 21, in 1900 on July 23, and now we go out between those dates. Strange! It is beautiful this morning. The barometer is climbing out of the box.

"We cannot speak of the facts which make up the hospitality of this camp—if we did our tale could be endless. We record, however, as we reached the clearing in the woods we received a message from Mr. White. It was in a bottle soundly corked. It perhaps floated down the river. The writing, deciphered, told us that it had been



THIS WAS THE END OF A SUCCESSFUL HUNT IN THE DAYS BEFORE THE CAMERA REPLACED THE GUN

The author is shown bringing to camp in a skiff on Whitefish River two large bucks that fell to his skill. Later he abandoned the rifle, but the knowledge of wild life gained in shooting days helped him in his nature photography.

waiting for us nine years. It was beneficent in its effect.

"EDWIN W. SMITH, *Scribe*.

"Approved, July 22, 1903.

"J. A. EVANS,

"ROBERT O. FRAZER,

"EDWIN Z. SMITH.

"By R. S. F., P. H. B."

JULY ON WHITEFISH LAKE

(A FRAGMENT)

In July the forest echoes to the laughter of the loon;

In July the tree-top feline fiddles to the laughing moon.

In the brush the playful polecat waves his plume of spotless snow;

And the spiny porcupine, he croons his love songs soft and low.

In July the mother duckling and the partridge in the woods,

With a fine maternal instinct toll the stranger from their broods.

Murmuring pines and graceful beeches wave above the lakelet's rim,

And a swarm of eager anglers paddle on the river's brim.

Formerly the sprightly fishes 'neath the waves would lark and play;

Now through every fin they shudder at the coming of McClay.

The red roebucks and the doebacks lately of the forest free

Wring their tails and stand from under when McClung climbs up the tree.

Wrong forever on the scaffold, right forever in the stew;

Thus the natives of the woodland furnish food to comers new.

In July the weary hunters hasten to the inviting pool,

And the hardiest of the swimmers proves himself the darndest fool.

Down into the depths he vanished four fathoms, more or less;

Had not Edwin manned the lifeboat, there had been one poet less.

What though sandflies and mosquitoes drain the lifeblood of the Judge,

If he feels his life in danger, let him sit beside the smudge.

With the keen-edged ax Urias easily bears off the palm,

And his lusty, skillful chopping sure would make a beaver dam.

In July the worthy Sachem, versed in all the hunter's arts,

Takes his camera and sallies forth to catch the bounding harts.

With his kodaks he has captured of his guests the outward parts;

With his cheerfulness and kindness he has also got their hearts.

To his pleasant old log cabin, we must shortly say farewell;

If we find none such in 'eaven, we will emigrate to 'ell.

—E. Z. S.

July 11, 1894.

A DOUBLE SURPRISE

One pleasant evening at Whitefish Lake, when we had a party of guests, we took supper on the house boat, and then went ashore and built a large fire at the base of a high rock. There we were sheltered from a chilly north wind and had the benefit of the reflected heat. As we gathered about the fire, I discovered that a box of flashlight powder had broken and spilled its contents in the pocket of my canvas coat.

Taking some of the loose powder in my hand I made a few mysterious passes over the glowing embers, sifting it down so it caused a sparkling display of little bright green, blue, and yellow flames. Having enjoyed the mystifying effect that this conjuring performance had made on my audience, I decided to get rid of the powder remaining in the pocket and turning the coat upside down, shook it over the fire. This was at once followed by a heavy explosion. The coat shot high in the air and then came to the ground all ablaze, with a jagged hole in the place where the pocket had been. My first use of the powder seemed to me to be a good joke, but the second performance was thought a far better one by the other members of the party.

Among the interesting visitors to camp was Dr. W. H. Drummond, of Montreal, famous as a writer of French dialect poems, such as "The Habitant," and "Johnny Courteau" (the latter dedicated to a member of my family).

Drummond was usually accompanied by two or three congenial friends from Detroit,



THE CARETAKER HAS A COMFORTABLE HOUSE AT WHITEFISH LAKE CAMP

The first story is of peeled hemlock logs stained brown, the upper story of shingled frame construction. In front of the house is the cabbage patch frequented at night by deer.

the apparent object being deer hunting, but roaming the forests, the backwoods meals, and the camp fire tales at night were the chief incentives. The worthy doctor, while a great fisherman, cared little about shedding the blood of any animals, but he, like the rest of us, was expected to shoulder his rifle after a hearty breakfast in order to take sufficient exercise before the noonday meal.

THE POET W. H. DRUMMOND GOES A-HUNTING

On the occasion of Drummond's first visit, Peter White, as host, was most anxious that he kill a deer, and toward this end a well-known sportsman offered to disguise himself as a guide, thus greatly increasing the doctor's chances of success.

The pair started for Cranberry Lake, about a mile east of camp, over a trail leading through a beautiful hardwood forest. In a few minutes the pseudo-guide turned sharply in his tracks and remonstrated about the noise the doctor was making. The would-be deer hunter was told to step into his companion's tracks so that fewer twigs would be broken.

This unexpected criticism was taken good-naturedly, and again the pair started on. I now quote Bob, the acting guide.

"On approaching Cranberry Lake, where I felt sure we would find one or more deer, the doctor suddenly called out, 'Bob, what do you think of this?' On turning about, I found him standing on a log, repeating a lengthy poem entitled 'Johnnie's First Moose.' His stentorian voice reached the shores of the little lake, and thereupon I made a half circle and started home. On coming within a distant view of camp, the doctor said, 'What camp is that ahead? I thought ours was the only one in the neighborhood.'

"'That's right,' I remarked, 'we are home again.'"

This shows the difference between the poet and the hunter.

THE POET STICKS TO POETRY

Inasmuch as the poem referred to was transcribed on the camp log, it is printed herewith. I think most readers will agree that this account of "Johnnie's First Moose" was of more permanent value than any deer the doctor might have bagged for the camp larder.

JOHNNIE'S FIRST MOOSE

(More Poickry)

De cloud is hide de moon, but dere's plaintee
light above,
Steady, Johnnie, steady, kip your head
down low.

Move de paddle leetle quicker, an' de ole
canoe will shove

T'roo de water nice an' quiet,
For the place we're goin' try it
Is beyon' de silver birch dere,
You can see it lak a church, dere,
Wen we're passin' on der corner w'ere de
lily flower grow.

Wasn't dat correc' w'at I'm toling you jus'
now?

Steady, Johnnie, steady, kip your head
down low,

Never min', I'll watch behin' me, an' you
can watch de bow,
An' you'll see a leetle clearer,
W'en canoe is comin' nearer,
Dere she is—now easy, easy,
For de win' is gettin' breezy
An' we don't want notin' smell us till de
horn begin to blow.

I remember long ago w'en me fader tak' me
out,

Steady, Johnnie, steady, kip your head
down low,

Jus' de way I'm takin' you, Sir. Hello! was
dat a shout?

Seems to me I tink I'm hearin'
Something stirrin' on de clearin'
W'ere it stan' de lumber shaintee.
If it's true, den you'll have plaintee
Work to do in half a minute if de moose
don't start to go.

An' now we're on de shore, let us hide de old
canoe,

Steady, Johnnie, steady, kip your head
down low,

An' lie among de bushes dat's bes' ting we
can do,

For de old boy may be closer
Dan anybody know, Sir,
An' lookout you don't be shakin'
Or de bad shot you'll be makin',
But I'm feelin' same way, too, me, w'en I
was young also.

You ready for de call? Here goes for num-
ber wan,

Steady, Johnnie, steady, kip your head
down low,

Did you hear how nice I do it, an' how it
travel on

Till it reach across de reever,
Dat'll geev some moose de fever!
Wait now, Johnnie, don't you worry,
No use bein' on de hurry,
But lissen for de answer; it'll come before
you know.

For w'y you jump lak dat? Wat's matter
wit' your ear.

Steady, Johnnie, steady, kip your head
down low,

Tak your finger off de trigger, dat was only
bird you hear,

Can't you tell de pine tree crickin'
Or de houl frog wen he's spikin'?
Don't you know de gray owl singin'
From de beeg moose wen his ringin'
Out hees challenge on de message your ole
granfader blow?

You're lucky, boy, to-night, wit' harder
man lak me,

Steady, Johnnie, steady, kip your head
down low,

Can tole you all about it. H-s-sh! Dat's
some-ting now I see.

Dere hee's comin' troo de bushes,
So get down among de rushes,
Hear heem walk! I tink he tonder,
He mus' go near fourteen honder,
Dat's de feller I been watchin' all de eve-
ning, I dunno.

I'll geev anoder call, jus' a leetle wan or two,
Steady, Johnnie, steady, kip your head
down low.

Wen he see dere's no wan waitin' I wonder
wat he'll do?

But look out for here he's comin',
Sapristi! ma heart is drummin'!
You can never get heem nearer,
An' de moon is shinin' clearer,
Wat a fine shot you'll be havin'! Now,
Johnnie, let her go!

Bang! Bang! You got heem sure, an' he'll
never run away,

Nor feed among de lily on de shore of
Wessonneau,

So dat's your firs' moose, Johnnie! Wall!
remember all I say,

Doesn't matter wat you're chasin',
Doesn't matter wat you're facin',
Only watch de ting you're doin',
If you don't, ba gosh you're ruin!
An' steady, Johnnie, steady, kip your head
down low.

WILLIAM H. DRUMMOND,

6 a. m., November 5, 1900.

Whitefish Camp.



SAUKS HEAD ISLAND WAS LESS THAN 100 YARDS FROM CAMP

For 40 years the author's family occupied tents at this attractive place a part of each summer. Note the group of Norway pines, each tree with branches only near the top, thus letting in plenty of sunlight and preventing dampness in the canvas habitations.

God bless our Home and God bless our Host.

—W. H. D.

On another occasion at Whitefish Lake Camp Doctor Drummond wrote the following characteristic dialect poem.

Le Vieux Chasseur

He's alway ketchin' doré, an' he's alway
ketchin' trout,
On de place w'ere no wan else can ketch
at all,

He's alway' ketchin' barbotte, dat's w'at
you call boule-pout,
An' he never miss de wil' duck on de fall!

O! de partridge do some skippin' w'en she
see heem on de swamp,
For she know Batee don't go for nothing
dere!

An' de rabbit, if he's comin', wall! you ought
to see heem jump!

W'y he want to climb de tree; he feel so
scare!

Affer two hour by de reever, I her hee's
leetle song,

Den I meet heem, all hees pocket foule of
snipe,

An' me! I go de sam' place an' I tramp de
w'ole day long,

An' I'm only shootin' two an' t'ree, by cripe!

I start about de sunrise, an' I put out me
decoy,

An' I see Bateese, he sneak along de shore,
An' before it's comin' breakfas' he's holler
on hee's boy

For carry home two dozen duck or more!

An' I'm freezin' on de blin' me from four
o'clock to nine

An' ev'ry duck she's passin' up so high!

Dere's bluebill and butterball an' redhead,
de fines' kin'

An' I might as well go shootin' on de sky!

Don't see do noder feller lak Bateese was
locky man!

He can ketch de smartes' feesh is never
sweem,

An' de bird he seldom miss dem, let dem
try de hard dey can

W'y de eagle on de mountain can't fly away
from heem!

But all de bird an' feesh too, is geev' up
feelin' scare,
An' de rabbit he can stay at home in bed,
For he feesh an' shoot no longer, old Jean
Bateese Belair

'Cos hee's dead!!

WILLIAM H. DRUMMOND,

November 9th, /99.

Camp of the Feline Paganini.

God bless our Home
And God bless our Host.

—W. H. D.

At present more than 65,000 big-game hunters of Michigan seek the woods each fall. A great proportion of these go with the same companions to the same localities year after year, and find quarters in comfortable log cabins in or near the hunting territory. A fellow sportsman who recently visited one of these camps in northern Michigan gives the following intimate picture of the congenial gatherings and the enduring friendships.

"Ontonagon County can and is boasting of what probably is the most interesting deer-hunting organization among the many groups of lower Michigan residents who cross the Straits annually to spend 15 days in the deer areas of the upper peninsula. It is known as the 'Galster Hunting Party', a group headed by John, Henry, and Charles Galster, of Petoskey, and has been hunting deer in the peninsula about 17 years, and in Ontonagon County the last eight years. This season there were 23 men in the party, but this is an unusually small personnel. In other years it has run from 35 to 40.

GALSTER CAMP IS AN OLD MINE SITE

"The Galster party camps at the old, abandoned Nonesuch mine location, one of the early-day copper properties located near the Porcupine Mountains about 20 miles from Ontonagon. The hunter's main camp is a large building used in the old days as a warehouse by the mining company. It is a long log building, substantially built and warm. One-half of it is used as a living room and the other half for sleeping quarters. Two sections of bunks, built in three tiers, each section accommodating 24 men, make up the 'boudoir', or 'Nellie's room' as it is labeled by a sign on the door.

"A lean-to built along one side of the building gives ample space for dining room and kitchen, and meals are served at a long table at which 40 guests may be fed without

crowding. And at dinner in the evening the table is none too large, because Captain John Galster and his boys dote on good fellowship and there is seldom a dinner without a few guests.

"The writer was privileged, recently, to be one of a group of five guests at dinner with the Galsters and their happy family of 'kids' grown up, and the experience brought a few hours of unforgettable pleasure.

"First of all, the dinner, prepared by an expert colored chef and served by his staff of four young men aides, was so good that there are no words to describe it. Imagine a meagre menu of soup, fried fish, roast beef, venison steak, mashed potatoes, peas, pudding, cherry sauce, angel food cake, coffee, tea, cigars.

"YARNS" ENLIVEN THE PARTY

"And as cigars were being consumed, Captain Galster arose from his seat at the head of the table and gave a brief talk which bubbled over with good-fellowship, formally welcomed the guests and reported the day's best 'yarns', taken from the hunting experience of his pals.

"That day one of the boys had shot a fine buck. The hunter had walked up to the prone deer and was preparing to dress it when he noticed that the buck's tail wagged every few seconds. Concluding that the animal was not dead, he decided to shoot it in the head, but as he lifted his gun, Mr. Buck leaped off the ground and darted away, five shots following it.

"Certain that the animal was mortally wounded, the hunter pursued. But there was no snow, and the trail was hard to follow. After three hours the buck was found, lying a quarter of a mile from where the hunter had first dropped him.

"Captain Galster concluded his address with a serious, heart-to-heart message to his party. He said: 'Boys, another day has passed. We have all hunted and we are all here, safe and sound. Remember, tomorrow is another day and I want every one of you to be careful. There must be no accidents. Don't shoot until you are certain it is a buck. Wait till you see antlers.'

"There never has been an accidental shooting in the Galster party and there is not likely to be. One might suppose that a party of 25 or 30 deer hunters would be something of an unorganized mob. Not so with the Galster group. It is well organized, in and out of camp. It has rigid rules of

conduct, and they are obeyed. In camp each man has a place to put his rifle, a place for his clothing, a place for all of his belongings and everything must be in its place.

"One sign on the wall says: 'Never bring a loaded rifle into the camp.' Another says: 'Don't shoot until you see antlers.' Another gives the signal code to be used when any member of the party is lost. One sign says: 'All are equal here.'"

"Near the main camp building the Galster party has constructed a Finnish bath house, and one of the camp rules is that each man must take a bath each day. No trouble, though, enforcing this rule. The bath is most welcome after a long day of hunting.

SPORT MAKES FOR FELLOWSHIP

"The 23 men in the Galster 'gang' this season represent almost that many different vocations. There are young men and old men. One is about 20, and one 79. There are merchants, bankers, a circuit judge, doctors, newspaper publishers, farmers, a police officer, and manufacturers. All are banded together for a good time and, above all, man-to-man comradeship. Of course, they hunt deer and try hard to fill their licenses, but if they fail—what of it? Who cares?"

"Just a word about the 79-year-old hunter. He is 'Dad' Hunt, a farmer by trade, but a hunter through and through and as young in spirit and actions as any man in the camp. He has hunted deer with John Galster for 30 years.

"After dinner in the Galster camp the boys waddle in from the dining room, let out their belts several notches and sink down into the many easy chairs to snooze, swap stories of the day's experiences, plan tomorrow's hunting and 'chin' in general. There is radio music, of course, and just to top off the dinner the chef sends in a basket of apples and two dish pans filled with buttered popcorn.

"To quote one of the men: 'Yes, we have plenty of fun and our gang has been together a long time. And our fun doesn't end November 30. From then until the end of next summer we talk about what we did this season, and there is no end of material to talk about. And when fall begins, we start planning for and talking about the next trip. Great stuff. Keeps us young and teaches us to love our fellow-men. Keeps the blood red and makes us live longer.'"

While I have detailed the conveniences

and the pleasures that come from occupying season after season a log cabin in the wilderness, it is also true that fine outings may be had by those who occupy tents pitched year after year on the same site. These temporary habitations are not subject so much to molestation, even in a remote place.

The modern waterproof wall tent, properly ventilated, and with a floor cloth, and protected against the intrusion of insects, affords a pleasant shelter. By the use of good camp beds, sound rest is assured even for the most fastidious.

One of these camping sites I can still recall with much satisfaction. It was on a small island of several acres that almost touched the south shore of Lake Superior, 18 miles northwest of Marquette. It was known as Sauks Head Island. Here from 1860 to 1900 three successive generations of my family camped each summer.

The island was almost solid rock except for a level spot facing the shore, where a pebble beach suitable for landing row boats was protected from the lake winds, while the scant sandy soil of the level spot contained a grove of large Norway pines that gave the camp a picturesque setting.

The Norway pine is found on islands, on headlands, and on the sand dunes or sandy plains close to Lake Superior. It is therefore typical of the growth on this extensive water front. It is tall, smooth-barked and sturdy, with a girth that varies little from its base to the first branches, which are usually high up and in close formation. This absence of limbs except near the top makes it possible for it to withstand heavy gales. We never felt any concern for our safety when the tents were pitched in such a grove.

COMRADERY OF THE CAMP FIRE

Near the island was the best of trout fishing, and the early hunting season of those days permitted the larder to be enriched by grouse, wild pigeons, and venison. On such a cozy spot the evening camp fire was a memorable feature, for there was plenty of dry wood on the main shore a few yards away. Then, too, there was an absence of insect life in a place free from brush and subject to the lake breezes, so that in daylight or darkness it afforded the tented occupants a pleasant haven.

On one of my outings with friends three of the party had never roughed it before, and some of the more experienced men felt



THE AUTHOR CARRIED HIS EQUIPMENT IN FIBER CASES

At the upper left is a large, light case for a 5 x 7 camera. Near it is a similar one for a long focus 4 x 5 camera; a box for four small flashlight cameras, and a light, commodious telescoping suitcase. In the lower left is the little "duffel" box containing many small essentials; a box for plates and films, and one for plate and magazine holders (see text, page 416).

concern over their comfort and the interest they might take in Nature's ways. One of the "greenhorns" was Edwin Z. Smith, who in later years became one of my most congenial camping companions.

To those who are accustomed to camping, whether it be beneath canvas or in a log cabin, there is a freedom of the wilderness and a comradeship among the members of a hunting or fishing party that is noteworthy. One is often advised never to seek the seclusion of the outer world unless he selects experienced and hardy companions. Such advice is often misleading; for again and again I have found that new members of the party, and sometimes those of whom the least was expected, have proved most energetic and congenial.

While urban life and regularity in certain well-defined lines of activity is likely to put one out of touch with the varying situations of an outdoor environment, there is inherent in most men an adaptability in meeting new conditions, and in many cases their reactions cannot be foretold.

When a party has paddled all day, and perhaps has made tiresome portages, when the tents are up and the camp fire is blazing beneath the pans and kettles, there comes a time of relaxation, and opportunity to

exchange comments on the day's doings. After the evening meal a larger fire is usually built, about which all gather to relate or listen to the tales of the wilderness. The guides often contribute an important share.

As evening wears away and the glowing embers die down, the tenderfoot on his first camp trip has already become initiated into the new life. One realizes that man's temporary reversion to the ways of his aboriginal ancestors is not after all so difficult.

Frequently sportsmen's magazines contain articles entitled "My First Moose," "My First Deer" or "My First Bear." These accounts are often scoffed at by experienced sportsmen, who see little occasion for a novice writing about his endeavors.

I have always taken the contrary view, for one who tells of his first outing after big game almost invariably describes his movements in such detail that the reader can readily picture the scene and perhaps learn something new.

The old-time sportsman, when referring to a hunting trip, too often puts it thus: "Left camp at daybreak, followed the track of a big buck for a mile, killed it with one shot, dressed it, and returned to camp."

Such an event when properly elaborated would have proved interesting and informa-

tive to hunters young and old. It seems to me unfortunate that those best qualified to depict the habits and the ways of wild life are often neglectful in this respect, besides being prone to discourage those describing their first outings.

Colonel Roosevelt, who, as a big game hunter, contributed bountifully to the literature on this subject, frequently expressed keen regret that many sportsmen in this country whom he deemed better qualified than himself had left such scanty records of their experiences. This is in contrast to the varied and voluminous writings of the European sportsmen who, although much fewer in number, have left so many invaluable personal records of the characteristics of game animals, and of their experiences amid conditions now passing or gone forever.

FIBER BOXES FOR THE SPORTSMAN

Many going on distant camping trips, be they hunters, fishermen, photographers, or nature lovers, are content to carry their "duffel" in trunks, canvas pack bags, wooden boxes and the like. At railroad station or port, this equipment is once more overhauled before passing through the portals of the wilderness. Little attention is given to the safety or convenient arrangement of many articles having an important bearing on the purposes of the trip.

Naturally, and especially in later years, my greatest concern was over the safety of my photographic apparatus; for were cameras, lenses, plates, or plateholders injured, I would be like a hunter with a broken rifle or defective ammunition.

My larger cameras were carried originally in leather cases or in reinforced canvas bags, while the smaller ones for flashlight work were packed in wooden or tin boxes. I soon found that a leather case was unduly heavy, that it easily absorbed moisture, and, moreover, that it afforded little protection against a heavy blow or other pressure. The last fault was likewise found in canvas coverings. Wooden boxes, too, were flimsy and inconvenient, and those of tin became dented or rusted.

I learned at length of a material having none of these defects, and with advantages

peculiarly its own. This was a thin, fibrous material in sheets, which when made up into trunks, suit cases, and smaller receptacles proved extremely light, and tough, absolutely waterproof, always holding its shape, and withstanding unusually rough treatment. It was so resistant and resilient that it would repel a blow like solid rubber.

In recent years manufacturers have put on the market telescoping fiber trunks and suit cases, which, besides being light and strong, are more readily adaptable to a varying load than hinged ones. In one of these trunks I placed most of my smaller fiber boxes. My smallest case was 10 x 9 inches and 5 inches deep, with a two-inch partition on one side (see illustration, page 415).

As illustrating the convenience of this little receptacle I give a summary of its contents on a trip to Alaska. In the larger division were a small hand camera, a long focus lens, a field glass, a small barometer, a trolling line and reel, a note book, and a pipe and tobacco. In the smaller partition were a compass, metal thermometer, tape measure, bifocal eyeglasses, waterproof match box, razor and small mirror, extra lens boards, surgeon plaster, safety pins, eye-screws, pencils and fishhooks.

I also had a large fiber suit case that was extremely light and commodious. In this I carried the small case just referred to, together with articles of a personal nature.

My largest field cameras were carried in light fiber boxes with shoulder straps attached. These camera cases I sometimes left overnight in distant blinds, and I knew that on returning in the morning, regardless of weather conditions, I should find the cameras in as good condition as if they had been under a roof.

It will also often be found convenient to transport tents, sleeping bags or assorted groceries and cooking utensils in such fiber cases. They serve as cupboards in the kitchen tent. Such boxes can be easily carried on making long portages by the use of pack straps. When in constant use for many years these boxes should be given a coat of shellac to ensure the continuance of their waterproof qualities.

CHAPTER XXII

Wilderness Guides and Their Ways

IN MANY parts of the country, as in Maine, New Brunswick, Newfoundland, and eastern Quebec, it is often possible to obtain the services of professional guides who serve fishermen during the summer and hunting parties in the fall. Many of them live in the woods during the winter as trappers, and thus acquire from continuous life in the open a varied experience that is far superior to that of many men who consider themselves skilled sportsmen.

BARRIERS VANISH IN THE FOREST

The services of good guides go much beyond mere attention to the physical comfort of their employers or the attainment of success as judged by the trophies taken, for in the wilds a companionship is developed between man and man more quickly than in most other situations.

Throughout parts of the Rocky Mountains, western Ontario, and the more northerly Canadian provinces, one must often depend on using men who act temporarily as guides, such as trappers, landlookers, lumber jacks, and local hunters. Men of this kind are often interesting and useful, although they are disposed in many cases to treat the outing as a joint affair where distinction between employer and employee is largely ignored. However, a sportsman who cannot get along with the ordinary run of such men is lacking in the real spirit of the wilderness.

Guides of another class are those connected with ducking clubs on the seacoasts and interior waters. In the East many such clubs are located on Long Island Sound and about the shores of numerous coastal waters, such as the Chesapeake, the Potomac, and especially the shallow bays and sounds of Virginia and the Carolinas.

The guides connected with many of these clubs have often served the same sportsmen for 30 or 40 years. In many cases rivalry exists among men employed by different clubs or even among those of the same club as to which shall make the sportsmen they serve the most successful.

I retained a membership in the Revel Island Club, on the ocean side of the Virginia peninsula, for more than 30 years. In many ways the guides there reminded me

of those in Newfoundland, for they were simple, straightforward, and wholly dependable, with the touch of superstition in many of their views so often found in Newfoundland and Canada. Many years ago I took one of these Revel Island guides on a thousand-mile trip along the south Atlantic coast, and he returned home with tales that greatly entertained and sometimes startled his fellows.

However, the main purpose of this chapter is to give the history of those guides I employed for ten or more years. Others, known for lesser periods, are mentioned here and there in the general text. The five guides I have selected for consideration represent a most unusual combination. One was a part-blood Sioux reared among the Ojibways; one a full-blooded Ojibway; another a full-blooded negro and former slave who had finally reached Canada by the underground "route" so often traveled by his kind before the Civil War; another a typical American born on Seneca Lake, New York; and the last a Norwegian, now serving me for his forty-fifth consecutive year.

JACK LA PETE, PART-BLOOD SIOUX INDIAN

Jack La Pete served several generations of my family in the role of guide and camp man. In my early experiences in the woods he figured prominently, as related in previous chapters. He was a resourceful man in the woods and from him I learned many a lesson that was helpful in later days. Jack was thin and short, and, because of a very dark and rather grotesque countenance, had received the nickname of Jack of Spades from my grandfather in 1860. The French term was gradually corrupted to Jack La Pete. His real name was Francis Nolin, and his Ojibway name was Bakakadoose.

As Jack became old and decrepit, he passed much of his time in his cabin on a hill at the south end of Whitefish Lake, a habitation that was a great improvement over the one occupied by us when he first conducted us to this beautiful body of water. Unable to do any hard work, such as rowing, paddling, or packing, he depended upon little contributions given him for work done at our camp, such as weeding garden or killing potato bugs. During the season of open

water, Jack always had fresh meat, for a deer could be killed at almost any hour in the slough just below his cabin. His failing eyesight demanded that he get within close range of his quarry.

I remember once climbing an overhanging tree in the south end of the slough, where, seated on a comfortable platform, I could pull one of several strings that led across the water to cameras set on the opposite shore. I had been seated on my convenient perch only a few minutes when I saw old Jack enter the slough in his dugout and knew that he was after fresh meat.

AN AGED HUNTER USES CUNNING

At a certain spot on the opposite shore was a locally famous large pine log that lay parallel to the bank, with a salt spring behind it. Many large bucks were killed at the spot each year. I had placed two of my cameras a short distance from each end of this log, and Jack's presence blocked any chance I might have of getting a picture.

Since I could not be seen, I concluded to watch his *modus operandi* in killing a deer only a few feet away. With some effort, Jack shoved his old water-soaked dugout through the mud and shallow water until he was about 10 feet away from the "buck log." When the dugout was in position, Jack made ready for a shot by placing his old musket athwart the canoe, and then he lay back quietly in the stern in a comfortable position.

Some 10 minutes had passed when I saw a deer in the reddish-yellow summer coat coming down the wooded hillside on one of the many runways that converged at this point. The deer looked up and down the shore and along its back track fearful of the possible presence of a timber wolf, but did not see Jack in his old weather-beaten canoe, that looked like a log, floating in the water, a place where danger was not ordinarily expected.

The hunter did not see the deer until it began drinking at the spring, and then he slowly reached for the musket. In pulling it toward him, however, he discharged it, and the deer bounded away, having learned that the quiet waters of the slough also demanded examination for possible enemies.

Disappointed by this outcome and probably having no more ammunition for his muzzle-loader, Jack slowly backed out and paddled off down the slough, quite unaware

of having had an eye witness to his misadventures.

In his earlier years Jack married one of his race, but never had any children. He appeared to have great affection for his wife, Mary, but when I condoled with him over her death by drowning in Lake Superior he said he had won a bet, though it was a poor kind of a bet to make. He had bet his wife she couldn't swim, and now she was gone, but he couldn't collect the bet.

His unconscious humor was further shown when he told me about the death of his mother-in-law. "Do you know," he said, "when I was driving her home in a cart she fell off the back end and broke her neck, and the funny thing about it is, she never even kicked."

Thereafter, deprived of all his family connections, Jack was always accompanied by a small dog. One dog he called "Toodley" after Doctor Kane's dog Toodles. This little dog was a source of entertainment to the population, for when Jack would say to it, "Laff a leetle," it would at once turn up its lips in an expressive grin.

After he had faithfully served three generations of my family, I once asked him how old he was. "I am old enough," he said, "to know better than to answer such a question." But in his later years he took pride in his age and always added a few years for good measure.

OLD JACK CELEBRATED ANNUALLY

During the later period of his stay in this region Jack led a simple and temperate life. Once a year, however, he had a grand celebration in town.

He would put on his best clothes and, with his long black locks glistening with bear's grease, go to a livery stable and select the best looking buggy and a horse that seldom went out of a walk. Then he would choose some good-looking young girl, red or white, as a companion, and traverse every street in town, repeating his appearance on the more crowded thoroughfares. He held the reins listlessly in one hand and used the other to wave greetings. He often rested his feet on the dashboard.

During these appearances Jack excited as much attention as a Lord Mayor of London. At that time Marquette was so small and self-contained that every one knew old Jack and gave him a cordial reception. On returning to the stable, he would pay the bill for his rig and hand a five dollar bill to



JACK ENJOYED HIS NEW CRAFT

When the old dugout was no longer serviceable, the guide was given a small flat-bottomed boat. A few years later he left for Manitoba, Canada, for a most unusual reason, and there he died in 1911, near the century mark (see text, page 421).



JACK LA PETE, INDIAN GUIDE

This portrait was taken at a time when his fancied resemblance to the Jack of Spades led to the nickname that afterward persisted. He served as guide for three generations of the author's family.

his young companion. The girls always took pride in being selected for this occasion by the kindly old Indian.

In the summer of 1893 Jack visited camp one morning and said he wanted to talk to me on an important matter. He was always very voluble, but never had much to talk about except events of past decades.

JACK LA PETE TELLS A QUEER TALE

This time he opened the interview by saying, "I want to go to Manitoba, in the Red River country, so that when I die I will be buried there."

No statement from him could have been more puzzling or astonishing, for Jack had lived with his Indian brethren on Lake

Superior for some 80 years.

His proposal to make such a trip evoking inquiry, he explained, "I have carried a secret unknown to anyone but my mother since I was 15 years of age. She told me then that I ought to know, but should conceal the fact, that she had been abducted on a raid made by Ojibway warriors on a Sioux camp near the Red River in Canada and that she had been brought to an Indian settlement of the Ojibways on Sault Sainte Marie River, where some years later she married a French trapper. 'Therefore,' she said, 'the Indian blood in you is that of the Sioux, and yet you have lived all your life with the Ojibways, their traditional foes.'

"Ever since I learned this, long ago as it was, I have kept in my mind that when the time came for the Great Spirit to call me I would die and

be buried in the land of my forefathers. This time has now come, but unless you and your friends provide the means for making the trip my last wish must be denied."

For several weeks after this we tried in every possible way to dissuade Jack from his intention to go among total strangers, where such relatives as he may have had must have passed away, but his answer was always the same: "You are denying my last wish."

Mr. S. P. Ely, a pioneer business man of the community and a friend of Jack's, agreed to raise the necessary money to send him on his journey, and also to provide an annuity for the remainder of his life. Mr.

Ely, who in addition to having a kind heart was something of a humorist, got a sheet of paper one foot wide and two feet long. In the first column he entered the names of some 15 subscribers who agreed to pay a small sum annually as long as Jack lived; but, to impress Jack with the generous character of these pledges, at the head of the ruled columns he had noted the succeeding years. The last pledges, if paid, would have made Jack 110 years old.

This seemed to some of the subscribers a rather clever joke, but, after reaching his new home, Jack continued to live on year after year, until toward the end only a few of the original subscribers were left.

The impression finally got around, after some 10 years had passed, that Jack's paper must have got into the hands of unscrupulous persons after his death, who were drawing his pension. In consequence of this suspicion I wrote Jack, asking a number of questions which he alone could answer.

In due course a reply came from a friend who customarily wrote Jack's letters, answering all of them and giving other facts from Jack that I had forgotten all about. Five years more passed, and the subscribers were reduced to three, when the suspicion arose again that Jack had died. He would then be nearly 100 years old.

HE OUTLIVED HIS BENEFACTORS

Another test letter was sent, written partly in Ojibway, requesting information which he alone could give. The reply to this was conclusive and indicated that only one or two of the contributors would live to see Jack exhaust the last year's pledge on the two-foot sheet of paper.

However, two years later I received a letter from St. Boniface, Manitoba, signed by a Roman Catholic priest who had watched over Jack for many years. It was dated November 30, 1911, and read as follows:

"It is a duty to me, as I promised my old friend Jack La Pete, to write you when he would be dead. He died on the 28th inst., in the morning, seated on his chair; he passed as a child, without suffering. Funeral to-day."

Thus there came to a peaceful end a centenarian who, always frail in body, showed ever an unbroken spirit in looking forward to rest in the country of his forefathers, even though the fulfillment of his wish de-

prived him of his old home and friends. His was a fidelity that bespoke a soul ready to make personal sacrifices for the assurance of a future life with his ancestral tribe.

Among the guides we had for many years along the south shore of Lake Superior was Fred Cadotte, a full-blooded Ojibway Indian, often called Fred Bawgam because of his relationship to a notable Indian chief of this region. Fred was a packer and assistant guide who in more than 30 years accompanied us on many hunting trips.

FRED CADOTTE BEGAN HIS SERVICES YOUNG

His services began when he was a slender boy of 14 who spoke only Ojibway. Later he grew to a height of 6 feet and 3 inches but never filled out in proportion. He was a quiet, good-natured woodsman who could always be depended upon. He it was who prevented the accidental shooting of the famous Robert Dollar.

Fred excelled any man I have ever known, either Indian or white, in his extraordinarily accurate sense of location, or, as it is termed, orientation. Often he accompanied me on deer hunts about Whitefish Lake when the forest, extending away for many miles, was an untracked wilderness. When he was along, I never considered it necessary to carry a compass.

On some of these hunts we would be out all day, and when the time came to return I would tell Fred that it was up to him to find camp. I had gained such complete confidence in his woodsmanship that I had paid no attention to direction or landmarks, as I would have done if by myself, or even with another guide.

Without any hesitancy Fred would turn and make a bee-line through the heavy forest, often for miles, and with unerring certainty would bring us to camp. At times on the way back we would cross the course we had followed on the way out, as shown by some notable landmark.

Even darkness failed to confuse this sense of direction. Once in the fall of 1882 we left the railroad track for Whitefish Lake Camp less than two hours before dark. The only route had been traversed so few times that no trail was visible. We left Fred at the railroad to make up a pack of our camp outfit, all of which he insisted on carrying.

Being unencumbered, my companion and I made fast time and arrived at camp just before dark. It was evident that it would be much later before Fred could come in with

his heavy load, and we built a fire to serve as a beacon when he came near.

About an hour after dark the light of the camp fire revealed Fred's tall, gaunt figure as it appeared on the edge of the clearing. As he came into the open he continued for a few yards the curious high-stepping gait he had been using in the woods in order to clear as much of the tangled brush underfoot as he could in the pitch-black darkness of the forest.

Approaching the fire, he threw down the pack with the remark "Gosh, you fellers must be hungry," and at once set about preparing some of the food he had brought. He took his trip through the woods at night as a matter of course.

A PERSISTENT WEASEL

After a successful deer hunt the following day we were seated about the camp fire before our lean-to in the evening. A weasel was seen on top of our rude table, helping himself to some of our venison hanging just above it. The intruder was within about 6 feet of us.

We drove it away repeatedly but it persistently returned. It was so bold and intent on getting at the meat that once I inserted my toe under its body and tossed it 10 feet away. Even this failed to discourage it, for it immediately returned to the meat.

Finally, to try to discourage the little beast, which we did not wish to kill, we placed the venison on a narrow shelf over one of the balsam beds in the lean-to. Soon after this we went to bed and within a few minutes the light of the camp fire showed the weasel climbing up to the shelf to renew its interrupted feast.

Fred was lying below the shelf and we told him to frighten the weasel away. He sat up and seizing a heavy shoe hurled it at the intruder. The weasel in its alarm crowded itself into a narrow crevice between an upright sack of corn meal on the shelf and the wall of the lean-to. The bag was so nicely balanced that some slight jar of the shelf made it tip forward.

The top of the bag was open, and as it turned down over the edge of the shelf the meal poured in a cascade over Fred's head and shoulders, giving him an extraordinary appearance in the flickering firelight. After the excitement of this amusing occurrence had subsided, we hung the meat where it could not be disturbed, and soon forgot the persistent little carnivore in sleep.

Fred's skill in orientation may have been aided by his remarkably keen eyesight, quite the best I have seen in a man, and a subconscious memory of topography. His acuteness of sight was a constant source of wonderment to me. With my long years in the woods and training in observation my powers of seeing and distinguishing birds or animals were insignificant when compared with his.

When we were passing through the woods, ruffed grouse often flew up and disappeared into the thick top of a tree. Almost without hesitation Fred would point out the perching bird in its fancied concealment. Along the way he constantly drew my attention to grouse perching quietly high in the treetops.

His ability to distinguish standing deer up to 100 yards or more away in the undergrowth was almost uncanny. Apparently, as we walked along, only a patch of the animal's side needed to be exposed for him to spot it by a casual glance. Frequently it required some time for me to distinguish the form of deer that had so instantaneously caught his eye.

Although Fred served as my camp helper and guide from the age of 14 years, his contacts with other white people were few, and his vocabulary was limited. Most of his emotions were expressed by the one word, "gosh."

One night we were seated by a camp fire beneath a big pine at camp when we heard some strange sounds from the treetop, "Gosh!" said Fred, "an owl."

IT RAINED OWLS

Looking up we saw the pale breast of a barred owl perched high on a limb. Taking a rifle, which was close at hand, I stood in front of the fire and, aiming upward, fired. A moment later three feathered objects came tumbling down nearby.

"Gosh!" exclaimed Fred, "three owals."

In mock disappointment I said, "only three? I expected six."

"Gosh!" said Fred, as he picked up the game.

Then the unexpected result of the shot was revealed. The big bullet had cut the bird I shot at into two fragments, and had killed its mate which was sitting behind it concealed by the leaves.

On coming out of the cabin early the next morning, I saw Fred carefully searching the ground among the bushes under the big pine tree.



THEY KNEW THE SECRETS OF THE WILDERNESS

Jake Brown (right) and Samson Noll (left) were two of the author's faithful guides. This picture was taken at Sauks Head Island in 1885.

To my inquiry as to what he was doing he replied, "Gosh! I am looking for dem oder three owls."

He had taken literally my jocular little remark of the night before.

Fred lived until his seventy-third year and died in a small cabin near Choccolay River, where he had a little farm. After his death, in memory of his faithful services and my many pleasant days with him in the woods, I had a small granite slab placed to mark his last resting place.

SAMSON NOLL, NEGRO GUIDE

Alongside the hotel at Marquette, where my family engaged lodgings for many years, was the large, old-fashioned mansion of the Ely family, of which two sons were the almost constant companions of my brother and me until post-college days. Hardly a week elapsed in the summer and fall without

our making excursions up or down the lake on hunting and fishing trips.

The boathouse in front of the Ely house contained an 18-foot rowboat, clinker-built, sharp at each end, and well adapted to stand almost any weather. Rarely did we use a sailboat or a launch, for these could not be hauled ashore when we camped, a necessary operation since there were few natural harbors in nearly a hundred miles of shore line.

Our principal motor-power was Samson Noll, a negro retainer of the Ely family (see above). Not only could he pull two oars in this heavy boat when others were not helping, but he was a wonderful cook.

Noll, born in 1819, had been reared as a slave on a Virginia plantation. He had married and was the father of several children. In an altercation with the overseer of the plantation in 1858, Noll felled the man by a heavy blow with a wagon stave.



FRED BAWGAM, AN OJIBWAY INDIAN,
WAS A SPLENDID TYPE

This fine Indian served the author and his family from the time he was 14 years old. He became a very powerful man, six feet three inches tall, and was noted for his keen vision and remarkable sense of direction in the woods. He died in 1925.

Not knowing whether he had killed the overseer or not, he fled into a swamp, evaded the bloodhounds, and after many nights' travel reached Detroit. Still fearing capture, he went to the then town of Windsor, across the river in Canada.

There he married again and at the close of the Civil War came to Marquette. At this place his wife cooked in a restaurant for several years, Noll often helping. On her death, he became connected with the Ely family.

Noll was as unique in many ways as Jake Brown. He was reliable and energetic, with

a fund of stories that usually kept the camp in an uproar. He was something of a philosopher, with keen perceptions; and though he could neither read nor write, few would have suspected his illiteracy.

His traits were well shown by an adventure alongside the tracks of the Northwestern Railway, where I had gone with one of the Ely boys and Noll to hunt deer on their way south during the fall migration. The tent was erected alongside a log cabin already occupied by other deer hunters.

In this locality the deer runways converged between a swamp and a hemlock ridge. Years before it had been customary for the hunters to sit in some concealment on the south side of the track and to fire upon any deer that attempted to cross. Later on, when more hunters began assembling, scaffolds were built on some of these runways north of the track, but ownership therein was never conceded, and the hunter getting there first was entitled to possession.

At sunrise on the day following our arrival my companion and I endeavored to get out early enough to occupy well-located scaffolds. Ely had been only a few minutes in his when he saw approaching the burly figure of Captain F., one of the occupants of the cabin, who ripped out an oath on finding the scaffold occupied. Captain F. was a famous market hunter and, although he had other sources of income, he always took a month off in the fall to hunt for the Chicago market.

About an hour later I heard a shot from my friend's scaffold. Since it was about breakfast time, I went over to see what success he had. I found him roping up a large buck so that we could drag it to the track several hundred yards away. Here it was dumped over the bank into the railroad cut and then we crossed over to camp, where Noll had breakfast ready.

On finishing the meal, we went back to dress the deer. To our astonishment it had disappeared. While we were talking about the matter, Captain F. sauntered up and we excitedly told him what had happened.

"Oh," he remarked, "I know where the deer has gone. I saw an ore train stop a little while ago and saw the deer taken on board. You said you were going to Little Lake because there were too many hunters here and I supposed you had got on board the ore train."

Noll, who had been sitting by whittling a stick, got up and approached the Captain,

who then began a denunciation of our carelessness, saying we were two tenderfeet and ought to have lost the deer for leaving it near the railroad track. Noll approached a little closer, evidently indignant at the criticism directed against his young charges.

Finally, when our derider stopped speaking, Noll said, "I bet I can find that deer within 300 yards."

NOLL WOULD NEVER BACK DOWN

Since this was a direct challenge to the Captain's veracity, we felt much concerned, and readily conceded that we had been very careless. Encouraged by our words and angry at his negro accuser, the Captain told a story about a warehouse that had been robbed repeatedly and mysteriously. At length a darky, detected coming out carrying a large cheese, explained his actions with, "Who put dat dere cheese on my back?"

While there was no particular point to this story, it was evidently aimed at Noll. Noll again declared that the deer was not far away and he was going to look for it.

While we tried to explain, we noticed that the Captain was getting nervous.

Fifty yards away Noll cried out, "There is a false trail leading down from the railroad bed into the swamp," and continued walking down the track.

The Captain then started in the opposite direction, stopping now and then to look over his shoulder.

Again Noll called out, "I have found another false trail," and a little farther on he went from the railroad tracks down into the swamp.

We could see that he had found something suspicious. A few minutes later Noll mounted a log and gave a lusty yell as he looked on the other side and then shouted, "I have found the buck."

We went down and carried it back to where it was originally. It took us only a few minutes to decide that we should break camp. On the return of the Captain and his fellow hunters there was apt to be a big row, in which it was more than likely Noll would be seriously injured. He never backed down when aroused.

We dismantled camp and prepared to board the next train for Little Lake some three hours later. When the train was about due, it became evident that the Captain and his friends hesitated about returning to their cabin. We drew a rough picture of a brake-

man reaching down from the platform of the caboose and seizing the buck. After the manner of mere youngsters we perpetrated a further mild form of retaliation by dragging all the bedding outside, where a vigorous rain that was falling would render the offenders' rest that night somewhat uncomfortable, if their consciences did not.

Three days later we broke camp at Little Lake and boarded the train for home with another deer as a companion for the buck. Learning of two fine canoes in the express car, we went forward to see them. Noll heard a noise beneath one of the boats and, looking under, discovered the Captain, who seemed to be intent on making a very careful examination. He had evidently seen us board the train and sought to avoid a meeting. Seeing that he was observed, he spoke pleasantly to us and retired.

On our return we found the Captain seated in the baggage car talking to the baggageman. The buck lay almost at his feet.

Noll remarked, "Here is an old friend of yours."

Pointing at the buck and giving it a kick, he warned the baggagemaster to keep his eye on it, because it had the habit of disappearing at the first opportunity. "The Captain can tell you all about it," he said.

To this the Captain replied, "Shut up; I have heard enough of this."

Noll answered, "Never open a ball unless you can dance."

None of us believed that the deer had been stolen for profit but that it had been taken in retaliation for our killing it from a scaffold the Captain expected to occupy.

NOLL SMOKED ONLY ONCE A YEAR

One peculiarity of Noll was that he smoked only once a year. This annual event usually took place at the beginning of our first camping trip of the hunting season.

As Noll was sitting by the camp fire in the evening, one of the party would approach and say, "Would you like a smoke?" at the same time offering him a large cigar.

Samson would take it and after a critical examination of the gift would always reply, "Anyone who smokes more cigars than I do has got to smoke two at once."

The yearly repeated phrase always received a laugh, and the ceremony ended.

This good guide died in a cabin near Whitefish Lake, at the beginning of winter, in 1898, while I was in the East. Last year, in trying to get the date of his birth, I asked



JAKE BROWN OFTEN VISITED JACK'S CABIN

As Jack became more decrepit, Jake Brown would call frequently, especially in the winter months, to see if his old friend was in need of food, fuel, or medical attention. This was the cabin the bear broke into and caused such havoc as described in a previous chapter.

a member of his race in what part of the cemetery Noll was buried.

The reply was, "Why, he is in my lot, and is beginning to crowd me a little since recent deaths in my family."

I thereupon got him a separate lot and erected a simple headstone as evidence of an unforgotten friendship for this once fugitive slave, who proved ever faithful to his wilderness friends in the great north country.

There are many references to Jake Brown in previous pages, but no effort has been made to signalize the fine character of this former woodland companion (see picture on opposite page). He possessed a delicacy of feeling that prevented any disposition to ignore the relation between sportsman and guide, and this very fact made it possible to treat him on terms of equality, aside from the assignment of duties clearly connected with his employment.

JAKE BROWN WAS A MAN OF PARTS

Jake, whose full name was Jacob H. Brown, was born about 1857, on Seneca Lake, New York, only a few miles from Cayuga Lake, where I attended college at Ithaca. When he was about 10 years old, he did a little trapping and fishing, but just before I went to that region he began driving a mule on the Erie Canal and in 1868 joined his brother as a market hunter in southern Michigan.

In 1881, when the deer became scarce there and the influx of venison from northern Michigan affected the local market, he came north to Marquette. There for several years he provided our little hotel with venison, this being served during the summer months as "mutton."

Several times I heard a great uproar in the rear yard of the hotel, and there I would see a stocky, towheaded individual without a hat, coat or vest, surrounded by the waitresses of the establishment. He was evidently regarded as a great wit, and his return to the hotel at the end of the week was always celebrated in the rear quarters in the manner mentioned.

On learning that this was Jake Brown, and that he shot most of his deer at the mouth of Whitefish River, the stream leading from Whitefish Lake, where my camp was located, I struck up an acquaintance with him. Jack La Pete being incapacitated as a guide, and Samson Noll more or less constantly employed by the Ely family, I made up my mind that Jake should be taken

over as a dependable substitute. From that time until 1898, when he left Henry Lake, Idaho, with a companion on a hazardous trip for the far northern gold fields in Alaska, he was continuously in the service of members of our family.

Although he had never received much schooling, he possessed a wide knowledge of worldly affairs, with a fine sense of humor and a quick wit. He once had charge of a Pittsburgh visitor on a deer hunt near camp. This would-be deer slayer had hardly ever been off a paved street and clung closely to Jake's heels as they traversed the unbroken forest.

At one point they stood on the bank overlooking a dense and tangled cedar swamp, a favorite hiding place for deer during the greater part of the day.

After a glance at this scene below, Jake's companion exclaimed: "My, what an evil-looking place."

"Yes," said Jake, "primeval."

On another occasion we passed a blazed tree on the way to camp, marked, "Turn to the rite," signed "Stiles."

Jake eyed this notice and said, "Uncle Jimmie was evidently thinking of his daughter's marriage rites last week."

Jake had a failing that was prevalent in the lumber and mining country at that time, but in all these years he never touched a drop of liquor when in camp, always refusing to join with the visiting sportsmen as the bottle was passed around. With equal zealousness he seemed to regard the time lost when in town if his wages were not put immediately into circulation. So rapidly did his money disappear on these occasions that in a few days he was ready to return to camp, whether anyone was there or not.

JAKE HAD ONE WEAKNESS

Often those who knew him in the woods remarked, "How unfortunate was Jake's failing, for he could have had a steady income as a merchant or business man."

To this I always said, it would have spoiled a good guide to fill some urban position in which there was already a superabundance of men. Like a pine squirrel laying up its winter supplies, Jake always saved his last wages of the season to buy pork, flour, and other necessities to carry him through the winter in camp. He would also shoot some deer before they migrated south; and by putting them under the snow he had an abundance of fresh meat until Spring.

During the winter months trapping occupied part of his time, and he made it a point several times a week to call on old Jack, in his cabin at the foot of the lake. More than once he found this old Indian incapacitated by rheumatism, and on such occasions he would cut a supply of firewood, visit Jack's fish net, sunk below the ice in the slough, and make a round of his snares, where rabbits were usually to be found.

The hearty appetites of most sportsmen when afield often excite a degree of irritation if the meals are slow or irregularly served. Jake was famous for his 15-minute dinners. He had the knack of putting on the frying pan, kettle, and pots in their proper sequence of cooking. The manner in which he constructed the camp fire assisted.

WHY THE COFFEE WAS DIFFERENT

When we first began visiting Whitefish Lake, our only shelter was a bark lean-to, and our cooking utensils were concealed in a hollow log. One afternoon we reached camp as darkness was approaching, and Jake hustled to prepare a quick meal. The coffee pot was removed from the old log, filled with water, and hung over the fire.

Later on, as the meal was being finished, I said, "Jake, you always make good coffee, but this breaks the record. I think I know the reason." Lifting the lid of the pot, I could see what looked like the discolored white of an egg floating on the surface.

Jake looked puzzled and said we weren't "within twenty miles of an egg."

Taking a long spoon, he fished out the object, which proved to be an extraordinarily large toad that had been using the coffeepot for its home.

Consternation reigned, but we retained the coffee. Thereafter when Jake was preparing a meal he would ask whether one wanted the coffee *à la mode* or *à la toad*.

In the middle nineties my camp was visited by a number of professional associates from Pittsburgh, as detailed at some length in the camp log appearing in a previous chapter. Their first visit was in 1894, and when they arrived the first inquiry was about Jake Brown, whom they knew so well by hearsay.

I told them he was in town, waiting the break of the Pullman strike, when he was to leave for Henry Lake, Idaho, as caretaker of a hunting club, of which my brother and an uncle, Colonel Howe, were members. This new job promised to be a congenial one, with

continuous employment in a place far removed from any groggery or saloon.

While parting with him reluctantly, I realized that this change would be for Jake's benefit. Unable to start on the trip because of the strike, he was quartered in town, where he gave many farewell parties. I told my friends that we could doubtless get him for a week or more. It was necessary for guests to walk to my camp from the railroad, four miles away, the lighter stuff being packed out, while the heavy articles were hauled on a jumper. Jake had a heavy pack, which he insisted upon carrying, containing some provisions and the extra garments used by the visitors.

As we approached camp and entered the yard, Jake was in front. I noticed at this distance a sheet of paper tacked on the kitchen door. Jake put on extra speed, and it was evident that he wanted to remove this note.

Since he had been the last one in camp, I felt sure it was a farewell message from Jake, who loved this log cabin and its associations to a degree that made his departure for the West a hard one. I hurried ahead of him, weighted down as he was by his heavy pack, and tore off the paper.

"Farewell, old log cabin, to you I bid adieu;
I may emigrate to Hell some day,
But never back to you."

When this was read to my companions, Jake gave a hollow laugh and remarked that the visit to the lower regions had only been postponed. A short time later he was able to go West to take his new job. As expected, his service at the club was much appreciated and he became a great favorite with the inhabitants of that region.

JAKE LOVED FLOWERS

Jake was a wonderful shot and a good trapper. In the kitchen he had few superiors. As had been his custom in Michigan, he raised the more important vegetables at the Idaho club, and in one corner of the garden he planted the seeds of foxgloves brought from Whitefish Lake Camp.

Although liquor was brought and circulated among the people of the neighborhood, Jake remained true to his habit of never drinking when in camp. But an evil day came, some four years later, when a saloon was started a mile back from the lake.

This he was induced to enter one day and returned to the clubhouse in a befuddled



NEWFOUNDLAND GUIDES KNEW THE WILDS

From left to right they are William Squires, an Indian trapper of the island, and John Hammer.

condition. No word of reproof indicated that his condition was noticed, but a week later the same thing happened and then it became necessary to admonish him.

Straightening himself up and folding his arms, he said to the remonstrator, "Either that saloon has got to go or I have got to go, and of course that means only one thing."

JAKE'S DEATH NOTICE PREMATURE

A few days later Jake found an adventurous companion and they planned a trip to Alaska overland with a pack train. Such a journey over the Rockies for more than a thousand miles was a desperate one but, as Jake said in explanation, "There are lots of big game and plenty of gold up there; but where we are headed there is not a saloon."

A month later Jake's companion returned with the tale that after an altercation over coming back Jake had seized his rifle, put on a small pack and said he'd go to Alaska alone. For years after this not a word was heard of him and all of his old friends felt certain that his bones were bleaching on some lonely mountain side in the wilderness.

To my surprise and pleasure, about 31 years after the last information concerning Jake Brown, I received the following letter from him:

"LANGLEY, WASHINGTON,
"May 3, 1929.

"FRIEND GEORGE:

"I write you a few lines to see if you are still living. I live on Whidby Island, 35



JAKE BROWN POSES BY HIS LAST HOME ON WHIDBY ISLAND

A chance visitor made this snapshot of the guide and his cabin. His provision is shown by the supply of stove wood under the shed.

miles north of Seattle. You passed a half mile from my cabin when you went to Alaska. I know the fellow that went out with you as guide.

"There are lots of deer here and plenty of ducks in winter, and across the sound, 12 miles from here, there are plenty of elk and grouse and lots of mountain lions and other game. I can kill ducks from the door of my cabin but they soon go north now. I am about played out, can hardly get around to look after myself, am laid up the most of the time in winter with rheumatism. With kind regards to yourself and family, I remain,

"Yours,
"J. H. BROWN."

To this I sent, in part, the following reply:

"WASHINGTON, 11th May, 1929.

"DEAR JAKE:

"Your letter of May 3rd caused as much excitement in the family as if the chimney had fallen in, though we were pleased by this surprise.

"It must be more than thirty years since I heard from you, directly or indirectly.

My last report was to the effect that you left Henry Lake with a companion and a pack train for an overland trip to Alaska. This seemed a perilous and uncertain expedition, so, when your companion returned saying that you had determined to go on alone the belief became certain in course of time that you had died from foul play or by some accident. However, your friends hoped that you would send word some day that you were safe and sound.

"The question now uppermost is what you have been doing during this long period, and just where most of your time was passed. Only last year I wrote a chapter on 'Guides in General and Particular' for a book in which I gave you a good send off but depicted your bones as being scattered by the four winds or wild beasts on top of the Canadian Rockies. I wish therefore that if you feel in the mood you will write me a summary of your adventures, some of which I may include in the chapter referred to as evidence that you are still alive.

"I am sending you under separate cover an article I wrote on Lake Superior which ought to recall some of the pleasant days passed in that region."

In response to my letter, he wrote as follows:

"LANGLEY, May the 27th, 1929.

"DEAR GEORGE:

"I was born in New York State in 1857, went to Michigan in 1868, to Lake Superior in 1881—then went to the Henry Lake Country, Idaho, in 1894—left there with a partner to go overland to Alaska. My partner backed out at Calgary, Alberta, Canada. I then struck west through the Canadian Rockies 500 miles to Ashcroft in British Columbia. By that time there were four feet of snow in the valleys.

WANDERINGS IN THE NORTH

"I struck a good job with a gang of timber cruisers for the rest of the winter at \$90 per month, had a good stake to start north. Got another partner and started the first of June as soon as we could get grass for the horses. Went due north on the old Caribou trail 125 miles to the Caribou gold mines.

"Then took the Telegraph trail which was very good in most places, through timber over two-thirds of the way, to Telegraph Creek, our destination.

"Saw lots of game, the country 200 miles north of the mines was alive with white-tailed deer and bear—saw from 50 to 200 deer every day, and more ruffed grouse and fool hens [blue grouse] than I ever saw before. The rest of the trip we saw any amount of moose, very tame; they would stand and watch you out of sight. It was a hunter's paradise.

"Made the 750 miles in 27 days, sold our horses and saddles and went to work at six dollars a day and board on Gravel Creek, a branch of Stikine river. There was a Hudson Bay boat running on the river.

"Worked in the placer mines the rest of the summer. When it got too cold for placer mining, got an outfit of traps and went into the mountains southeast of the Dease Lake country. Made \$1500 but it took nearly one-third of the money to get the grub and outfit in.

"We stopped in that country for seven years. Prospecting some in summer or working in placer mines. Struck gold in a great many places, but never could get enough for a day's pay, after paying for the grub. Some places where we were it cost one dollar per pound to get supplies in. Not one in a thousand ever made a good stake out of gold in that country.

"When they made the big strike at Dawson, we were 450 miles south of Alaska on head waters of the Mackenzie River, at Fort Dunvegan in Northwest Territory. We stayed for 18 years trapping for the Hudson's Bay Co. They would never pay over half what you could get for fur outside. We were the ones that found the wood buffalo. They paid us 15 dollars a skin, it was worth that much to get the skins out. We caught a good many beaver and otter, fox, and mink.

"That country beats any place for wild fowl that ever I saw. We used to gather eggs by the canoe load, pack them in spruce needles, and they would keep for six weeks. Any amount of moose and bear. In the winter millions of caribou came down from the north. The railroad goes through that country now; all game will soon be gone.

"Kind regards to yourself and family,

"Yours,

"J. H. BROWN."

"(P. S.) Yes, sure I remember the decoy bear at Sand River and the loon eggs at Sauks Head. I know of places southeast of the Dease Lake country where there are plenty of moose, mountain sheep and goats, and very handy to get at. Very much nearer than any of the guides will take you, for they like to make a long trip, as one trip is about all the most of them get. I don't suppose you will go to Alaska again, but some of your friends might go. The only guide work I did up north was to show some young Scotchmen about. They used to get a good many moose, caribou, bear, and goats. They hunted late in the fall so that the scalps were all prime."

The following letter of a later date gives further information concerning Jake's affairs.

"LANGLEY, September 26, 1929.

"DEAR GEORGE:

"I moved to this island about ten years ago, because there was plenty of deer and some fur which helped out a lot. I hunted all of the San Juan Islands that were any good. Deer is there yet, but the fur is gone. Then I had a good cabin on Whidby Island to move back to in the spring. I kept hunting the islands until the rheumatism got so bad that I could not row a boat any more in sea and tide.

"I saw a man from the Olympic Mountains a week ago; he said elk and deer are



THE NORWEGIAN, JOHN HAMMER, WAS
HALE AND HEARTY IN 1935

He posed for this picture in his 74th year and after 45 years of service as the author's guide. His name will appear more frequently in the second volume of this work.

very plenty there, eat up all of the crops in some sections. They have only had one open season on elk in 15 years. Fifteen days on deer every year, the deer are very large on the slope of the mountain, some bucks weigh over 300 pounds. Do you do any hunting there now with gun? Have you got any movie pictures with the camera? I showed the GEOGRAPHIC MAGAZINE to my friends here and nearly all of them had seen your name in print. Will have to put the book away, these old timers thumbing it, it won't look very well.

"I have knocked around a whole lot but never found a place I liked half as well as

Whitefish Lake, but I am all right here now.

"From your old friend,

"J. H. BROWN."

On March 11, 1931, Jake wrote from his cabin on the shore of Whidby Island that he continued to shoot a few ducks and blue grouse but was too badly crippled by rheumatism to go into the fallen timber of the forest for larger game. He said that his only neighbor, on a strip of beach 12 miles long, was another man in a cabin half a mile away, but that the salmon fishing season would soon open and he would have plenty of company from among the fishermen during the summer.

JAKE HAS HIS PICTURE TAKEN

On September 14, 1931, Jake wrote as follows:

"I had hoped that some one camping this summer in my vicinity would come along and take a snapshot of me in front of my cabin in order to comply with your wish for a recent picture. No one came, so after a wait of three weeks I put on my best duds and went ashore where I invaded a so-called studio. The result of the encounter I send you. I can now understand how some of the wild animals feel when you take their pictures.

"I live on the west side of the island, which is 50 miles long, and am not near any settlement. All boats from Seattle pass within a mile of my place going or coming. When I selected a spot for my cabin I expected to build it of logs, for there's a lot of red and white fir, white pine, hard maple, hemlock, besides big alders, tag alders, and wild cherry. Before I cut down any trees a large lumber barge lost its deck load in a big storm and I picked up five thousand feet of board, so I hadn't much chopping to do.

"This summer I raised potatoes, peas, beans, corn, and turnips. For flowers I had lots of sweet peas and sunflowers, for I like to see flowers about as I did at Whitefish Lake and Henry's Lake, Idaho. Even old Jack La Pete had a patch of sweet williams about his cabin. In addition to the big game previously mentioned we have ruffed grouse, thousands of California quail, but the Bob White quail introduced here couldn't stand the climate, tho' the ring-neck and Chinese pheasants have all done well. We are having the largest catch of salmon in ten years. With thirty-eight traps they lift five tons

of fish to the trap, three times a week. They will soon clean up all the fish at that rate.

"We generally have three or four light falls of snow, but an awful lot of cold rain and cold winds. The coldest weather was in 1924 when it froze up around here for twenty-six days, although zero was not reached.

"I am mighty glad to hear from you and John Hammer. I would like to be back again on Lake Superior, but I am in no condition at my age to be of any real service, so the curtain had better fall on me here.

"Yours,

"JACOB H. BROWN."

I have quoted these letters at some length because they show the typical life of the old-time wandering trapper, prospector, and mountain man of the West, who commonly passes his old age in a lonely cabin, crippled with rheumatism but with self-content in his freedom among the wild places of the earth.

JAKE'S SECOND AND FINAL DISAPPEARANCE

The last letter from Jake, sent from his island home under date of October 29, 1932, contained references to his garden, and to the fact that he had just killed a fine buck, which he was sorry he could not share with me, concluding with his usual inquiries about our friends of the Lake Superior region. I answered this letter in a few days, but it was never received, the reason being indicated by the following communication:

Office of
Prosecuting Attorney
Island County,
Coupeville, Washington

Nov. 19, 1932.

Mr. George Shiras, 3d,
Marquette, Michigan.

DEAR SIR:

Mr. Jacob H. Brown, more familiarly known to us as Jack Brown, seems to have disappeared; he was last seen near his cabin on Friday, the 11th day of November, 1932. It seems that Jack was in the habit of staying very closely at home and not having seen him for a few days, neighbors reported the matter to the sheriff, who has made considerable effort to locate Jack. When last seen, he was walking along the beach not far from his house and was then walking toward the house. The sheriff found the house unlocked and has taken charge of the

papers and letters and also money left in the house.

We fear that some accident has befallen him, for we know of no reason why he should leave his house in the condition it was and remain away from his usual place of abode. If he had become sick he would no doubt have remained at home or gone to a neighbor. His house was on the shore of the water and it is possible that he may have fallen unconscious while on the beach and that his body was carried out with the tide; his boat being on shore in its usual place, it is not probable that he went out fishing and met with an accident in that way.

Finding correspondence from you we thought it best to advise you of this situation. We have found nothing that indicates foul play. Any information that you may give us will be appreciated.

Yours very truly,

JAMES ZYLSTRA,
Prosecuting Attorney.

This distressing information led me to telegraph for later details, and in the course of time came a letter from the prosecuting attorney that he had no further news about Jake, but as the beaches had been patrolled and the neighboring forests searched Jake's friends were still of the opinion that he had been stricken on the beach and carried out to sea.

At this writing it seems definitely determined that the mysterious disappearance of Jake will never be satisfactorily solved. Doubtless Davy Jones' locker now contains the mortal remains of my old and faithful guide. The ebb and flow of the mighty ocean will be commemorative of this restless and venturesome spirit who has finally left the windswept shores of his island retreat for a haven of eternal rest.

JOHN HAMMER, NORWEGIAN GUIDE

John Hammer (see picture on opposite page) was born in Christiania, Norway, in 1858, where he worked for a few years in an optical factory and, like many others among his countrymen, devoted much spare time to sailing, fishing, and out-of-door life. He came to Detroit in 1880, where he married and worked as a mechanic for two years. He then came to Marquette, where he had similar employment in an engine works.

The president of this company, who was a great trout fisherman, discovered that

John could pull a vigorous oar, was not timid in bad weather, and could promptly provide an excellent meal over an open fire. He was taken on many trips, some for the day and some for the week or longer.

I met John about 1885, when he had taken up guiding as a vocation in the summer months. He went with many of us on different camping trips about Lake Superior.

On the death of Samson Noll and the departure of Jake Brown and Jack La Pete for other fields, John became my regular guide. The interest shown by him in wild-life photography led me to take him on many long trips to widely scattered parts of the country from Mexico to Alaska and Newfoundland.

John is jack-of-all-trades. He can paint, do excellent carpentry, and repair machinery and photographic apparatus. He is a born oarsman and paddler and in his younger days could pack and cook with the best of them. For these reasons our boats were always in good trim, and the camp equipment was adequate and in good order.

For more than 30 years John was second in command of my little house boat on Whitefish Lake and again in Florida, on a similar boat having its own power. His knowledge of machinery and aptness at the wheel proved of value.

Besides this he was always, as might be

inferred, sober, energetic, and dependable in times either of tranquillity or stress. The frequent references to his work in other chapters obviates the need of a detailed account here. It may be added, however, that after John came to Marquette to live, his wife presented him with a son and a daughter, who in due time reached maturity and married. Their half dozen children consoled and gladdened the heart of this old Norwegian after the loss of his wife, who died unexpectedly while he was with me on my second trip to Alaska. I see John several times a week when I am in Marquette, and now that my field activities are done it is a pleasure to talk over old times with him.

JOHN IS STILL WITH THE AUTHOR

In the late fall John precedes me to Ormond Beach, Florida, where he has a comfortable little cabin in an orange grove 50 yards behind my home. His principal duty there now is to begin feeding the birds before I get there, and to tell me what is going on among the furred and feathered neighbors that so long engaged our attention in the neighborhood.

John has saved some money and with a small pension his future is comfortably provided for. His services as a "camera guide" of more than 45 years distinguishes him above all others in this vocation.



CHAPTER XXIII

Eyes That Shine at Night

IT HAS long been known that the eyes of certain animals shine from the reflected rays of a bright light at night, or in the daytime when they are back in a cave or other dark recess. It is also known that this reflection of light is not due to the ordinary glistening of the moist surface of the eyeball, but comes from a lustrous layer on the retina next to the choroid coat, called the *tapetum lucidum*.

The light thus reflected has a luminance that varies in intensity from a dull glow to a phosphorescent brilliance almost like that of a diamond. In addition to their varying intensity, some animals' eyes also vary in color from white to red, yellow, blue, and green. The reflection from the eyes of large mammals, such as deer and the large cats, when a strong light is used, can be seen 100 yards or more away.

Such eyes, usually, have the steady brilliance of a star or a ball of fire, and as a person with a light approaches animals in the darkness, the eyes can be seen long before the light reveals the body. Curiously enough, when one approaches a deer so closely that its body becomes brightly illuminated, the glow of the eyes disappears.

It has seemed strange to me that, with the modern advance in optical knowledge, I have never been able to find any satisfactory study or explanation of the cause of this vivid glow in an animal's eyes.

ERRONEOUS IDEAS, OLD AND NEW

In ancient and modern writings, both scientific and otherwise, these glowing eyes frequently have been the subject of comment, which as often as not has been inaccurate or misleading. Many have thought, and this idea is still more or less prevalent, that the light seen in eyes at night is phosphorescent. Others have thought that the glow is inherent, so that the eyes of animals possessing it will shine after dark or in unlighted rooms, regardless of the absence of an independent source of light.

Literature is filled with the accounts of the terrifying effect of glowing eyes surrounding people out in the forest at night with no light of their own. Such tales are purely imaginative and, of course, wholly erroneous, since the illumination seen in the

eyes is always merely the reflection of a bright light.

Two disks of tin, the size of a five-cent piece, fastened a few inches apart on the trunk of a tree will so reflect the light from a hunter's lantern as to deceive all but the most expert. I used this method to detect or mislead hunters who were shooting at night in violation of law. Fortunately, this destructive method of hunting is now prohibited in all the States.

THE JACK LIGHT IN NIGHT HUNTING

The Indians seem to have been the first on this continent to use an artificial light in hunting deer at night. Their apparatus, placed in the bow of a canoe or dugout, was a crude affair consisting of a receptacle containing lighted pine knots. Behind it was placed a screen, usually of bark, to conceal the hunter and protect his eyes from the glare. As a stronger light was needed, strips of dry birch bark were dropped in, making a bright flare.

This method was known as "fire-hunting." The range of the illumination was limited and short-lived. Usually the deer was located by some sound heard ahead and then inflammable bark was added to the smouldering fire. The animal thus revealed was shot within 30 or 40 feet.

When the white man learned how easy it was to kill a deer with the aid of a light, different forms of lanterns were employed, the one most commonly in use during my youthful days being called a "bull's-eye." The lens in such lanterns concentrated the rays from the small light so that a deer's eyes could be seen within a distance of 50 or 60 yards. Since the light was not strong, the body of the deer could be seen within only a very short distance.

The bull's-eye lantern was strapped to the forehead of the hunter so that whether he was hunting in the woods on foot or in the bow of a canoe he could, by turning his head, readily cover a semicircle in front of him. If used on the water, this method was generally called "jacking," and if on land, "headlighting."

Those of us who formerly hunted at night from a canoe came to prefer a small oil lamp with a concave reflector protected

by a circular plate-glass door. This kind of light not only revealed the deer's eyes from a considerable distance, but disclosed the animal's body when the hunter was near enough to shoot.

Later, when taking flashlight pictures by hand, I found the same kind of lamp entirely satisfactory. For this purpose the lamp was manipulated in a slightly different manner. When the deer became visible, the jacklight was turned slightly to one side, and an approach was made to within 25 feet, the distance of the camera focus.

LIGHT DIMMED FOR PICTURES

By turning the jacklight to one side, I could see the deer, though only by the dim light from the rim of the reflector. The illumination was sufficient to blind the animal to the approaching canoe, but did not frighten it so much as the full light.

The dimming of the light I consider of prime importance, not only because it permits an approach within such a short distance, but because a deer seems to regard the dimmed light as more distant, and acts more naturally than it would were a blazing lamp seven or eight yards away, turned full upon it. In more than half the deer pictures I have taken in this manner the animals show no signs of alarm or even of curiosity. In more recent years the use of acetylene gas and electricity has made jacklights much more effective.

Meanwhile, through the use of a jacklight, I have garnered numerous observations concerning wild creatures from Canada to Panama that seem worthy of record in this connection. The differences in colors of light reflected by the eyes of different animals are striking, but the color appears to be the same among individuals of the same species.

The color of the reflection from such eyes may vary slightly through external causes, such as fog, smoke, and other atmospheric conditions and from the size and color of the artificial light and the degree of darkness. At times it has appeared that the color reflected in certain individuals of the same species varied a little, because perhaps of age, sex, or physical condition.

If different colored lights are directed toward a mirror in a darkened room, the reflected light will be of the same color. In the case of the eyes of animals, however, this agreement in color does not hold except in a minor degree.

While the eyes may appear to reflect the yellow light of an oil flame or the white rays from acetylene gas or electricity, it will usually be found that this is the natural color of the reflection from the eyes of the animal tested. In experiments I made with glass of different colors used in front of the lantern, the color of the reflection did not appear to be affected materially.

By the use of the jacklight the naturalist may find and collect specimens of night-loving animals that are otherwise difficult to obtain. This is especially true in the Tropics, where the dense vegetation and the few openings make it almost impossible to see many night-prowling species. The concentrated rays from the light bring out the gleam of fiery orbs amid the heavy foliage. The inexperienced collector may have no idea what his gun has brought down or even whether the victim wears fur or feathers, until he picks it up.

One night in the Zoölogical Park in Washington I stood in front of a semicircular group of cages and, without changing my location, directed the light on a red fox (*Vulpes*) whose eyes showed ruby red; then on a gray fox (*Urocyon*), the eyes of which shone yellow; and finally on a lynx, whose eyes glowed brilliantly green. Here were three distinct colors from the eyes of three animals, two of which belonged to the same family but to different genera.

INFERENCES FROM OBSERVATION

From this and other observations I have come to the conclusion that the light rays must undergo some mysterious change before they are reflected back. Furthermore, this change seems to be constant and peculiar to a species or a closely related group of species. It is obvious, therefore, that once a careful observer becomes familiar with the color of the reflection from the eyes of the different animals in his locality, he can thereafter identify the species by this means with considerable certainty.

It should not be understood that the colors of light reflected from the eyes of animals are flat and lusterless as they might be if shining through colored glass. On the contrary, the glow from the eyes often has the shifting brilliancy of light reflected from the facets of precious stones. At a distance the glow is steadier and more like that of a twinkling star, but when the animal is much nearer, but before its

body becomes visible, the effect is that of a glowing jewel lighted from behind.

There is sometimes also a perceptible difference between the glow of the eyes at a distance and that caused by a small, strong light shining directly on the eyes from a few feet away. In the zoölogical park, at a distance of 40 yards and more, I found that the eyes of lions glowed brilliantly. They gradually became duller on a nearer approach, until at ten yards or so the reflection disappeared.

When a small electric torch was held within a few feet of the lion's eyes, they appeared like two small green globes. In them small darker spots seemed to circulate rapidly, like the moving life in a small aquarium globe.

VARYING BRILLIANCE OF THE LIGHT AND ITS EFFECT

Conducting my investigations among the animals at the zoo, I found that light was reflected from the eyes of the American bison, mountain sheep, mountain goat, tapir, and collared peccary. Among the carnivores in addition to those already mentioned, luminous eyes were seen in the jaguar, leopard, mountain lion, tiger, and wildcat.

The reflections were very bright from the eyes of the raccoon, marten, otter, mink, weasel, and badger. A number of species of bears, including the black, grizzly, big Alaska brown, and polar, all showed a distinct but dull glow.

On a pleasant night in November, 1932, I made another visit to the Washington Zoölogical Park to test the eye reflections of animals either entirely neglected or insufficiently studied before. A powerful electric lamp, used for this purpose, enabled me to compile the following data:

Mountain sheep: deep green, large and brilliant; mountain goat: yellowish, rather small and dull; yak: greenish yellow or yellowish green, very large and brilliant; llama: orange red, brilliant; tapir: reddish yellow, fairly brilliant; mountain lion: green, changing to yellow at certain angles, fairly brilliant; bobcat: green, varying to yellow, fairly bright; eland: greenish yellow, brilliant; guanaco: deep green, brilliant; red deer: greenish, varying to yellowish, brilliant; California sea lion: orange reddish, with flashes of green, bright; Patagonian cavy: reddish yellow, moderately bright; Kodiak bear: reddish, rather dull; polar

bear: greenish, fairly bright; Himalayan bear: reddish yellow, rather dull; alligator and caiman: deep red, varying to yellowish red, bright.

In the North I had learned that the eyes of the nighthawk, a member of the goat-sucker family, would shine brilliantly under the light. The nighthawks, circling for insects about the electric lights at Gatun, in the Canal Zone, glowed brightly when seen from the proper angle.

Once, in the course of our visit to this tropical region, Mr. Anthony went "head-lighting" in the forest for specimens of the cat family. Seeing a large pair of eyes glowing from the top of a tree, he fired, expecting to get an ocelot or similar animal. Instead of the crash of a heavy body falling through the branches, he heard a light swishing sound and found beneath the tree a specimen of the giant goatsucker of the genus *Nyctibius*, the largest American representative of its family. Though disappointed, he had proved that another member of this family has the *tapetum*.

On other occasions we found that the large species of rodents, such as the agouti and paca, could easily be "shined" at night like the rabbits in the North, although the eyes of northern rodents, so largely nocturnal in habits, appear to lack the power to reflect light.

In the upper Chagres we found a species of fish which apparently fed mainly at night. Its eyes glowed under the light like those of the other night feeders, the crocodile and alligator. The results obtained in Panama enlarged the list of the animals that I personally have proved to have reflecting eyes. They convinced me that the possession of the *tapetum* is directly associated with night vision, and is of exceeding value to its possessor.

A MONKEY'S EYES GLOWED

Up to the time of my visit to the Canal Zone I had not found a single member of the *Primates*, including man and the monkey tribe, that had eyes reflecting a light at night. It is true that my tests had included only species of diurnal habits, as in the case of man.

It was with special interest, therefore, that I took advantage of the opportunity to test the eyes of the little nocturnal owl monkey whose rescue from the flooded forest is described in the general account of my work about Gatun. Selecting a dark



HE PROTESTED AGAINST AN INTRUDER

When the author approached shore with his largest lantern in the bow, this deer's eyes appeared as a faint glimmer 100 yards away. At closer quarters the eyeballs grew bright and luminous, turning to a limpid black when the animal's body became distinct. The deer's anxiety was shown by a series of whistling snorts and the pawing of the ground with the front foot, an interesting manifestation seldom so clearly revealed to the night hunter.

night, I turned the lantern on the little fellow as he sat on the upper framework of the porch. I was greatly pleased to see its eyes glow like two brilliant diamonds.

This little so-called night monkey may, in reality, belong to the lemur family, which is allied to the monkeys. The lemurs are small, strictly nocturnal, and have eyes that reflect a light at night.

In a general way it may be said that the eyes of all carnivores, or predaceous animals, including those of the dog and the cat families, glow with reflected light. The same is true of virtually all hoofed animals.

On the other hand, this power is absent in the vast majority of members of two great orders in the animal kingdom, the *Primates* (including man, apes, and monkeys) and the *Rodentia* (which contains the beaver, muskrats, porcupines, and hosts of rats, mice, and related small beasts found in all parts of the world). The eyes of certain nocturnal birds, reptiles, amphibians, and fish will glow at night like those of some mammals, as will also the eyes of some spiders, beetles, and crabs.

The general rule that members of certain groups of animals do not shine at night has marked exceptions. The eyes of most rodents do not glow, but those of the agouti and the paca are exceptions, as are those of the rabbits and hares.

SOME BIRDS' EYES SHINE

Among the birds, the members of the goatsucker family, including the whippoorwills, parouques, and the giant tropical goatsucker (*Nyctibeus*), have brilliant eyes at night, but surprisingly the eyes of the owls lack this power (see *Shining the Chuck-Will's-Widow*, page 179, Volume II).

It appears obvious that the possession of eyes having the power to glow with reflected light at night is not confined to strictly nocturnal animals. Most hoofed animals and some carnivores are also diurnal in habits, and a host of rodents that lack this quality are almost strictly nocturnal.

Many questions suggested by study in this interesting field remain unanswered. Why is it true that the eyes of many mammals, birds, reptiles, amphibians, fishes, insects, and crustaceans reflect light with varying brilliance, while the eyes of a host of other animals show no trace of this characteristic? Why do eyes vary strikingly in the color of the reflected light, apparently with little or no reference to the color of the light itself?

To the beginner some puzzling problems develop when he approaches with a jacklight a deer or a moose. Many times when I first shot under the jacklight, I wondered why a paddler in the stern could not see the shining eyes that appeared to me in the bow as brilliant as two stars.

THE ANGLE OF REFLECTION

It was not until after I had substituted the flashlight camera for the gun that I discovered that one had to be immediately behind the jacklight to see the glowing eyes, and that if the light was turned diagonally toward an animal on shore, the reflected light in its eyes could not be seen by one in the stern of the canoe. The only time a person so located could see the eyes was when the canoe was approaching the animal head on, as was often the case on narrow streams with the light kept usually straight ahead.

To determine some of these problems under controllable conditions, I tied a collie dog to a tree and experimented with the jacklight. When I held the lantern anywhere from the level of my waist to the top of my head, I could see the dog's eyes plainly, but when I lifted the light well above my head or placed it on the ground in front, I lost the reflection. Held by the extended elbow, the light produced a bright reflection; but held at arm's length, it showed nothing.

When the light was placed some four feet in front of me and turned toward a deer standing at right angles to the length of the canoe, no reflection could be seen. This last test explained why I had often missed seeing a deer's eyes from the side of the canoe. I had not been in the direct line of light from the lantern to the deer. Thus was solved a mystery of many years' standing.

Repeatedly, when entering the long narrow slough at the south end of Whitefish Lake, we kept the light pointed straight in front so that any deer on the sand beach at the head or on each side of it would be blinded and could not see us advancing. Halfway down the slough, on the left-hand side, was the first of a series of salt springs or licks, to which the deer came frequently. When we were opposite this spot, the canoe would be stopped and the light turned cautiously at right angles to the canoe, toward the lick.

Although we were too far out to see the body of a deer, the distance was just right for the animal's eyes to shine brilliantly.

Many times I turned the light as indicated and, seeing no glowing eyes, proceeded toward the beach. Often a deer would snort and run up the bank from this lick.

At first I supposed the animal must have had its head down, or that it was looking toward the shore, so that the eyes could not be seen. Because this happened frequently I concluded that with the light turned at right angles, while I looked ashore from farther back in the canoe, I was not in the line of the light and hence was unable to see the reflection. The truth of this inference was fully confirmed by later tests.

As a boy, I left camp one night just as the full moon rose, to visit an artificial salt lick close by an abandoned lumber camp. A trip of a mile up the lake shore brought me to the spot and, climbing the steep bank, I looked carefully over the top. I could see at the lick a gray body with its head down.

I must have made some noise, for the animal at once turned toward me, and I was surprised to see a pair of glowing eyes. The glow had been caused by the reflection of the brilliant light of the moon, which was directly behind me near the horizon.

When night-hunting deer one night in the fall of 1883 I went out alone on a small lake with the jacklight placed far from me in the bow of the boat. Noticing the eyes of a deer shining at some distance ahead in the edge of the woods, I approached and fired.

The brilliant orbs still continued to glow, and I fired again. Finally on the third shot I became convinced that no live deer would stand such a bombardment and went ashore to investigate.

DEER'S EYES GLOW AFTER DEATH

There I found an unusually large buck which I had killed with the first shot. Its spreading antlers had caught in the branches of a dead cedar and thus prevented the body from falling to the ground. The head had been held in such a way that the eyes continued to be turned toward me.

I have never determined how long the eyes continue to glow after death, but probably it is only until *rigor mortis* sets in. Any one who makes this test on a freshly killed animal should remember that the eyes shine only when the body cannot be plainly seen. The light, therefore, must be more than 20 yards away.

The reflection of light from the eyes of animals seems purely mechanical. At times it may be independent of the circulation of the blood and of life.

In the early fall of 1884, in company with a friend, I went jacklighting one night on Au Train Lake, about 35 miles east of Marquette. Although this is a large lake, there was one part of its shore known as Buck Bay, where usually a big buck could be killed almost any night.

We were unsuccessful because another hunter had taken the best location, and because it was a damp, chilly night and few deer were moving, we decided it was best to return to camp.

TIN EYES SHINE AT NIGHT

By way of having fun with our rival, we went down the river to our camp and cut from a can two small discs, the size of five-cent pieces. Returning up the river a short distance, we tacked them to the trunk of a tree about four feet from the ground, where the jacklight of the returning hunter would cause them to shine like the eyes of a deer.

We put out the camp fire and waited. In a few minutes we heard reports from both barrels of a shotgun. Two more shots rang out a few seconds later. Then apparently our dupe discovered the deception. As his canoe silently passed our camp, we made our amusement evident.

I came to regret this prank when the deceived hunter became my good friend and associate. We never referred to the subject and he seemed ignorant of the identity of the participants, till one night 30 years later an elderly woman relative of mine told the story before him. He laughed heartily.

One night while we were paddling along the base of a hill, we heard the crack of a twig in the woods above and turned the jacklight in that direction. There glimmered a small bluish orb which I took to be the eye of a deer standing partly turned away from us. Training my rifle on this glistening spot, I fired in the expectation of knocking over a deer.

Jake, in the stern, said, "Unless your rifle can shoot a million miles or so, I wouldn't shoot any more."

Low down over the hill top was a small but brilliant star that peeped under the lower branches of a tree.

CHAPTER XXIV

Some Game Laws Past and Present

SINCE Michigan at one time contained more white-tailed deer than any other State and is still well toward the top in this respect, it seems in order to consider the series of steps taken in that State to perpetuate these animals.

The first practical step to curb the slaughter, which in recent years has totalled 75,000 annually, was the shortening of the season. This has been followed by further reductions from time to time until only a 15-day open season in November is now allowed.

OPEN SEASON ON DEER 1859 TO 1932

1859-1869—August-September-October-November-December.

1869-1875—September-October-November-December.

1873-4—October-November-December.

1875-6—August 1-December 1.

1877-1880—August 1-November 15.

1881-1886—August 15-November 15.

1887-8—November 1-December 1.

1889-1894—September 25-October 25.

1895-6—November 1-25.

1897-1904—November 8-30.

1905-1910—November 10-30.

1911-12—October 15-November 30.

1913-1922—November 10-December 1.

1923-1932—November 15-December 1.

While the table above shows a considerable variation in the extent of the season in earlier years, it will be noticed that after 1912 shooting was restricted to two or three weeks in November, when there was usually good tracking snow and the rutting season was at its height. The season therefore offered excellent opportunity for buck hunting.

Concomitant with the gradual shortening of the shooting season, many other restrictive measures were passed. In 1881 sale of venison stopped eight days after the close of the season, and carcasses could not be legally transported after this period.

In 1887 hounding was prohibited. This destructive method was gradually outlawed throughout the other northern States, although a few southern States still permit it to their great detriment. The wildest of old bucks secreted in a dense swamp, and beyond the reach of a hunter, could be quickly ousted from its retreat by well-

trained hounds and driven into the open, where hunters stationed at likely places were usually able to kill it.

The use of set guns, snares, and steel traps became illegal in due course, and the next step was the prohibition of the use of artificial salt licks. During this period bounties were placed by the State or counties on timber wolves which were becoming more and more destructive when the deer were forced to yard in the northern forests.

The bounty system was often ineffective or wasteful, and in the endeavor to improve it, experienced state trappers have been employed by the Conservation Commission. The change seems fairly successful.

The next change, and a very important one, was the ban placed upon the use of an artificial light in hunting deer at night. The law applied both to the employment of the headlight by hunters in the woods and to the use of a jacklight in a canoe on the lakes and streams, where thousands of deer, mostly does and fawns, were easily killed by the most inexperienced hunters.

In 1895 the first deer license law was passed, limiting the hunter to five deer each season. Great benefits were expected of this measure, for besides curtailing the kill of the average hunter it was expected to drive the market hunter out of business.

FIRST LIMITED KILL NOT EFFECTIVE

On a previous page it has been pointed out that by a strange psychological influence the five coupons attached to the license induced hundreds to go deer hunting for the first time or to continue persistently in the effort to kill this allotted number of deer. At the same time the market hunters, by taking out licenses for all members of their families, or through the aid of accommodating friends, were able to kill very nearly as many deer as before and with the increase in the price of venison to reap rewards that compensated for any lessening in the number killed for the market.

Then came two later restrictions of vital importance. One limited the kill each season to one buck, thus giving continuous protection to the does and their fawns of the year. The other prohibited the sale of venison.



MIGRATION ONCE INVOLVED CONSTANT PERIL

Before the enactment of the Federal migratory bird law, millions of wild fowl, including shore birds, twice each year had to run the gauntlet of throngs of fowlers along the main flightways, such as the Atlantic and Pacific coasts, and the Mississippi Valley, where the daily kill was almost unlimited by State laws. Now spring shooting is prohibited, and that in the fall cut short.

In connection with improving conditions relating to wild life in Michigan it is a source of gratification to me to observe the excellent work being done of recent years by the non-political State Department of Conservation under a competent Board and Director, George R. Hogarth, whose death in 1934 was greatly regretted by game conservationists throughout the country.

BENEFITS OF THE BUCK LAW

So well does the buck law, when effectively enforced, build up deer and elk herds that the increasing total sometimes threatens starvation in limited areas and necessitates a regulated kill of the females as the only practical method of keeping the animals within reasonable limits. This I have pointed out in dealing with the mule deer of the Kaibab Plateau, Arizona, and other limited ranges for deer, elk, and moose.

In Michigan, however, it will be many years before the deer of the State in general are threatened with starvation by reason of their superabundance. Especially will this be the case if a sufficient number of forested areas are saved as game refuges and permanently maintained to provide for the increasing animals.

In 1917, in order to get at the scientific facts relating to the operation of the buck law, I applied to experts in the Biological Survey for an estimate of what would be the total number of deer produced by 24 does and their successive offspring in a 10-year period, based upon an average of $1\frac{1}{2}$ fawns

for each doe annually after the first breeding year. The answer was a total of 3,120 deer, or 1,560 bucks and 1,560 does.

Taking a single doe as a unit in this calculation, experts show that when a hunter kills a young doe he destroys by a single shot the potential production within the next 10 years of 65 bucks and 65 does, or a total of 130 deer. If he had shot a buck, it would have meant the loss of only a single animal. By the death of the original doe the link in this chain would have been irrevocably broken.

Such a result is not, after all, so mysterious, if we keep in mind the methods of reproduction applicable to domestic animals. If a farmer had as many bulls as cows, or as many roosters as hens and killed his stock without regard to sex, he would, of course, be classed as demented.

Just because our wild animals bear their young in remote thickets, we seem to think their maintenance is based upon a different principle. We went on killing the females, year in and out, under the blind assumption that it would make no particular difference in the future supply. Actually such indiscriminate killing represented the difference between extinction and perpetuation.

Before there was a buck law, it was well known that does and fawns were much more readily shot in the open country they usually occupied than the bucks that hid in dense swamps or were otherwise more capable of taking care of themselves.

It ought to be plain to all who will intelligently appraise the results of a well-admin-



MODERN LAWS HAVE HELPED THE SITUATION

In early days the open shooting season for migratory birds exceeded nine months as against a much shorter season for resident game birds in the more provident States. Now spring shooting is prohibited for both migratory and non-migratory birds, the length of the season in fall and the bag limits are much reduced, and sale of game is forbidden.

istered buck law that it has fully earned the commendation accorded it.

The protection of does has already proved the most effective means of putting an end to the annual killing and maiming of hundreds of sportsmen, although the great increase in the number of persons seeking the woods, many of them inexperienced; the use of high-power rifles; and the concentration of hunters by reason of a short season and the lessened areas in which they have to hunt are problems largely beyond legislative control.

Those who bitterly contend that they may lose a buck by not shooting when the animal's sex is not clearly established belong largely to the class who are afraid they may lose a deer simply because a man's identity is not established when they fire.

THE SHIRAS GUN LAW

In order to prevent the illegal killing of deer during the long closed season of eleven and one half months when, in my judgment, the deer killed illegally under the existing law exceeded those lawfully killed in the short open season, I prepared for the Michigan legislature, in 1925, a bill that I felt quite certain would go a long way toward checking much of the illegal hunting, not only of deer but of other game.

This bill was enacted in the year mentioned. It provided that hunting arms should not be carried during the closed season in any game areas except under a special permit. The text follows:

Section 1. It shall be unlawful for any person to carry a rifle into an area frequented by deer during the closed season thereon, or to carry a shotgun into an area frequented by large or small game when there is no open season on such game under the existing laws, except as herein-after provided.

Section 2. The conservation department or any conservation officer or any person deputized by the conservation department, shall be authorized to issue, free of cost, to any legal resident of the United States over the age of sixteen a permit to carry a firearm into the hunting territory of the State, but the violation of the laws protecting wild animals or birds during the closed season thereon, when such person is the holder of such permit, shall subject the offender to the confiscation of firearms in possession and to a fine of not less than one hundred and fifty dollars nor more than two hundred and fifty dollars, and in default of same, to confinement in the county jail for not less than thirty days nor more than ninety days.

Section 3. The department of conservation is authorized and directed to prepare a form of permit mentioned in section 2, good for one year from date thereon, wherein the application shall state the purpose or purposes for which the permit is asked, said permit having printed thereon the penalty or penalties to which the holder becomes subject in case of the violation of any laws protecting game animals and birds during the closed season. A list of such permits shall be furnished the department



IN THE DAYS BEFORE RESTRICTIVE GAME LAWS HUNTING BROUGHT THESE AS SPOIL

In the early years at Whitefish Lake Camp the author and his fellow sportsmen always welcomed the first good tracking snows in October and November. At such times they made up parties of friends for the hunt.

of conservation or to any local conservation officer requesting the same.

Section 4. All persons entering a hunting area, if they desire to do so, five days before the opening of the season and during said season, shall be entitled to a permit, provided such person has a proper hunting license.

Section 5. Any person carrying hunting arms in areas frequented by game animals or game birds during the open season thereon without a permit shall have such firearms confiscated and be subject to a fine of not less than twenty-five dollars nor more than fifty dollars or, in default of payment thereof, shall be confined in the county jail not less than ten nor more than twenty days: provided, this section shall not apply to the owner or occupant of any lands on which he is regularly domiciled while protecting such lands or property thereon.

Approved April 23, 1925.

FRAUD IN PERMIT USE DIFFICULT

It will be noticed in the second section that the constitutional rights to carry arms is respected. At the same time, should any one violate the game laws while holding a special permit, he would have imposed upon him a penalty much heavier by reason of his breach of faith. Thus fraudulent use of a permit is discouraged.

It had long been recognized that there were several classes of law violators of a very different character. One class consisted of thousands who visited the woods and waters during the summer and early fall for recreational purposes. There were fishermen, camping parties, and automobile tourists, many of whom carried guns with no deliberate intention of violating the law. They were often tempted, however, to shoot a deer when they saw one.

Another class of violators were those who entered the woods for the purpose of killing deer, and who felt there was little chance of detection if they used ordinary caution. It was very unlikely any game warden would actually see them shooting a deer. When one was killed, its body would be secreted and removed after dark.

This class was largely made up of home-steaders, trappers, landlookers, lumberjacks, and others living within or near the deer forests. Not infrequently hunters from the towns and villages would use an automobile in visiting wild tracts, accessible by lumber roads, and after killing deer

would return at night with very little chance of detection.

A continuous temptation lay in the fact that an average-sized deer was worth from \$15 to \$20, representing three or four days wages for many of the hunters. An experienced hunter ordinarily could kill a deer in a few hours in a good deer area.

There seemed no way of clearing the woods of these poachers under the existing law, for game wardens were few and unable to cope with this large and scattered army of illegal deer hunters. When, however, the above quoted law went into effect a remarkable change for the better occurred.

Camping parties no longer carried guns on their summer jaunts, and the pot hunter realized that if he were caught carrying a gun in a hunting area his conviction was a certainty. At last these heretofore brazen creatures seemed to develop a conscience, for now a game warden might be standing behind almost any tree.

To judge the benefits of a new law, nothing serves so well as the study of its operations during a given period.

The chairman of the Committee on Conservation has furnished me with the following list of convictions and penalties down to July, 1931:

Year	No. of convictions	Total Fines	Total Costs	Jail Sentences Days	Guns Shot Days	Confiscated Rifles
1925	100	\$2,115.00	\$591.22	30	29	37
1926	106	1,928.00	526.35	60	26	43
1927	177	3,365.00	1,100.04	140	43	88
1928	145	2,398.50	873.63	170	40	57
1929	248	4,931.05	2,061.17	40	56	98
1930	287	4,312.60	2,234.42	1,000	65	106
1931	81	470.00	342.90	570	26	27
Totals	1,144	\$19,520.15	\$7,729.73	2,010	285	456

It is not the total number of convictions or the amount collected in fines each season that represents the full benefit of this law. Where one offender is publicly convicted and adequately punished, there may be a hundred others who are discouraged from undertaking to violate this law. They have discovered the ease with which it can be enforced and the heavy penalties involved.

GAME REFUGES AND PUBLIC SHOOTING GROUNDS

One of the final steps in conserving the deer of northern Michigan and one with a fair prospect of perpetuating these animals indefinitely, regardless of any marked increase in population or the development of the country, lies in the immediate establish-



SUCH TROPHIES MAY BE TAKEN SAFELY UNDER THE BUCK LAW

Had four does fallen to the rifle, instead of the four males shown above, the potential loss of these females and their descendants during a ten-year period would total 520, or a loss to the breeding stock of 260 does, and loss to the sportsmen of 260 bucks.

ment of large, well-wooded and properly located game refuges.

Many problems are involved in this undertaking. Aside from the need of acquiring suitable lands, there is the necessity of funds for purchasing them and properly protecting them against trespass.

There is a sufficient supply of summer food for the deer. What is most needed is a winter range with an abundance of browse and cover that will safely carry the animals through the long winter months.

These refuges may run from 2000 acres up to 15,000 or more and be sufficiently well defined by a circling wire, which gives ample warning to the hunter and at the same time does not prevent the free movement of the deer.

NO HARDSHIP FOR HUNTERS

When large refuges are acquired in the best part of the deer country, thoughtless protests are apt to be made by persons excluded from favorite hunting areas. It must be remembered that when a large number of deer in a given area have been permanently protected from the hunter their increase becomes so rapid that most of the animals will visit the surrounding territory in search of food. In the short shooting season a fair number of the bucks will be killed, and without any undue strain on the breeding stock.

Surrounding some of the larger refuges there should be public shooting grounds. This latter suggestion has often met with vehement protest from irrational sentimentalists who decry the idea of giving absolute protection to an animal on a preserve, and then inviting its destruction if it passes beyond the wire defining its retreat.

The reasons for any such public shooting grounds are of prime importance. In the first place, land surrounding a refuge may either be used exclusively by the owner or his friends, or be taken over by hunting clubs to the exclusion of the general public.

All fair-minded sportsmen of today recognize the propriety of maintaining the American system of shooting, where the average man has a chance, and is not selfishly denied such opportunities as is the case in most European countries.

Such public shooting grounds should be patrolled as a precaution against fire or trespass. Whenever special conditions required modifications of the refuges or shooting grounds the changes could be made by

executive order or by law with a facility not possible if the land surrounding the refuges were in private hands.

Toward the close of my yearly hunting trips to Revels Island, on the eastern shore of Virginia, I became increasingly impressed by the continued rapid decline in the numbers of both shore birds and wild fowl in that region. The cause of this was very apparent but difficult to remedy. At that time these migrant game birds were wholly within the control of the States.

Long hunting seasons; spring shooting, with excessive killing by sportsmen at all times; and the inroads of great numbers of market hunters, supplying a constantly increasing demand in the large cities, made a combination that seriously menaced the existence of all the most desirable migratory game birds. Because these birds did not permanently remain within a State and a general idea that their numbers were inexhaustible, they were hunted mercilessly wherever they went.

Although the great increase in the number of shooters, their concentration along migratory flight ways in spring and fall, the deadliness of modern arms, the drainage of swamp lands, and the commercial use of the water-ways made conditions at this period generally adverse to the welfare of aquatic birds, yet the blindness of human nature to the future, so far as market hunters and selfish sportsmen was concerned, was the same then as it was in 1857, when the Ohio Legislature made the following report:

"The passenger pigeon needs no protection. Wonderfully prolific, having the vast forests of the north as its breeding grounds, traveling hundreds of miles in search of food, it is here today and elsewhere tomorrow, and no ordinary destruction can lessen them or be missed from the myriads that are yearly produced."

RESULTS OF A MISTAKE

Within 30 years after this pronouncement the tens of millions of wild pigeons that once darkened the skies in their seasonal flights had become totally extinct, simply because the States afforded them inadequate protection.

The attitude of the legislative mind at that time in all the States may be expressed as favoring "an open season on migrant game birds when they are within the State and a closed season during their absence." This resulted in an open season during the



HOUSE COMMITTEE ON PUBLIC LANDS, 58TH CONGRESS, 1903-05

In the absence of any committee on game protection, the author arranged with Speaker Cannon to be made a member of the Committee on Public Lands which had jurisdiction over the unappropriated Public Domain. To it was referred the use of lands for national parks or monuments, national forests and game refuges. The committee members in the picture above are, right: Major Lacey, Iowa, Chairman; J. C. Needham, Calif.; "Uncle Joe" Fordney, Mich., co-author of the Fordney-McCumber Tariff Act; Jos. M. Dixon, Mont., later Governor and U. S. Senator; George Shiras, 3d, Penn., author Migratory Bird Bill; J. S. Burnett, Ala., author of Immigration Act; John Lind, Minn., former Governor of the State. Left: J. M. Miller, Kan.; E. W. Martin, S. Dak.; A. J. Volstead, Minn., author of the Volstead Act; Philip Knopf, Ill.; B. B. Rodey, delegate, New Mexico. Absent when this picture was taken: F. W. Mondell, Wyo., majority leader, 66th and 67th Congresses, and Carter Glass, Va., later Secretary of the Treasury and U. S. Senator.

fall and spring months everywhere and an open season during the winter wherever the birds remained in the more southerly parts of their range.

With such migrants often passing through a half dozen States within a week or less a State jurisdiction became a farce. Extermination, as in the case of the passenger pigeon, was almost a certainty.

In an endeavor to meet this situation, I, being then a member of Congress, prepared and introduced a bill which, because it was the first effort at legislation of this kind, I record here in full.

Fifty-eighth Congress, 3d Session.
H. R. 15601.

In the House of Representatives.
December 5, 1904.

Mr. Shiras introduced the following bill, which was referred to the Committee on Agriculture and ordered to be printed:

"A BILL TO PROTECT THE MIGRATORY GAME BIRDS OF THE UNITED STATES.

Whereas experience has shown that laws passed by the States and Territories of the United States to protect game birds within their respective limits have proved insufficient to protect those kinds and classes of said birds which are migratory in their habits and which nest and hatch their young in States other than those in which they pass the usual hunting season, and in some cases breed beyond the boundaries of the United States; and

Whereas such local laws are also inapplicable and insufficient to protect such game birds as, in their migrations, are found in the public waters of the United States, outside the limits and jurisdiction of the several States and Territories; and

Whereas the absence of uniform and effective laws and regulations in such cases has resulted in the wholesale destruction and the threatened extermination of many valuable species of said game birds, which cannot be practically restored or restocked under State laws applicable in the case of game birds having their permanent habitat within the respective States and Territories: Therefore,

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all wild geese, wild swans, brant, wild ducks, snipe, plover, woodcock, rail, wild pigeons, and all other migratory game birds which

in their northern and southern migrations pass through or do not remain permanently the entire year within the borders of any State or Territory shall hereafter be deemed to be within the custody and protection of the Government of the United States and shall not be destroyed or taken contrary to regulations hereinafter provided for.

Sec. 2. That the Department of Agriculture is hereby authorized to adopt suitable regulations to give effect to the previous section by prescribing and fixing closed seasons, having due regard to the zones of temperature, breeding habits, and times and line of migratory flight, thereby enabling the Department to select and designate suitable districts for different portions of the country within which said closed seasons it shall not be lawful to shoot or by any device kill or seize and capture migratory birds within the protection of this law, and by declaring penalties by fine or imprisonment, or both, for violations of such regulations.

Sec. 3. That the Department of Agriculture, after the preparation of said regulations, shall cause the same to be made public and shall allow a period of three months in which said regulations may be examined and considered before final adoption, permitting, when deemed proper, public hearings thereon, and after final adoption to cause same to be engrossed and submitted to the President of the United States for approval: Provided, however, That nothing herein contained shall be deemed to affect or interfere with the local laws of the States and Territories for the protection of game localized within their borders, nor to prevent the States and Territories from enacting laws and regulations to promote and render efficient the regulations of the Department of Agriculture provided under this statute."

INTENT OF FIRST BILL TO EDUCATE PUBLIC

I made no effort to have action taken on this original Migratory Bird Bill, for I recognized that its purpose, at first, should be educational. I retired voluntarily from Congress at the end of that session in order to take up more seriously the work of a field naturalist.

The Migratory Bird Bill, however, in slightly modified form, was reintroduced during several following sessions and finally enacted by Congress as the "Weeks-McLean

Bill"—so called for its sponsors in the House and Senate respectively. To aid in the administration of the law, the Secretary of Agriculture appointed an Advisory Committee as detailed in the following Associated Press Despatch:

ADVISORY COMMITTEE OF FIFTEEN ON THE
PREPARATION OF REGULATIONS BY THE
DEPARTMENT OF AGRICULTURE FOR THE
PROTECTION OF MIGRATORY BIRDS.

[Associated Press]

"WASHINGTON, D. C., July 21, 1913.—The Department of Agriculture announces the selection of fifteen men prominent in the protection of game and other birds in various sections of the country to advise Secretary Houston in framing regulations to make the new Federal protection of migratory birds effective. To these men, who will serve without remuneration, will be referred certain questions arising in connection with the tentative regulations recently published by the Department in connection with the Act of March 4, which gives the Federal Government jurisdiction over the migratory birds of the United States.

The fifteen men selected, and who had already consented to assist in this advisory capacity, were as follows: John B. Burnham, New York city, President of the American Game Protective and Propagation Association, Chairman; F. W. Chambers, State Fish and Game Commissioner, Salt Lake City, Utah; Prof. L. L. Dyche, State Fish and Game Warden, Pratt, Kans.; W. L. Finley, State Game Warden, Portland, Ore.; E. H. Forbush, State Ornithologist, Boston, Mass.; Dr. George Bird Grinnell, New York, Vice-President of the Boone and Crockett Club and former editor of "Forest and Stream"; Dr. William T. Hornaday, New York, Director of the New York Zoological Park; Hon. John F. Lacey, Oskaloosa, Iowa, author of the Lacey Act, regulating importation and interstate commerce in birds and game; Marshall McLean, New York, Chairman Committee on Conservation of Wild Life of the Camp-Fire Club of America; T. Gilbert Pearson, New York, Secretary National Association of Audubon Societies; Hon. George Shiras, 3d, Washington, D. C., author of the original bill protecting migratory birds; Gen. John C. Speaks, Chief Warden, Columbus, Ohio; W. P. Taylor, Berkeley, Cal., Chairman

Committee on Conservation of Wild Life in California; Hon. John H. Wallace, State Game and Fish Commissioner, Montgomery, Ala., and Major Bluford Wilson, Springfield, Ill."

The Committee, in subsequent years, met annually, the membership changing from time to time in order that it might continue to be as representative as possible. Any proposed changes or additions to the regulations were submitted by the Chief of the Biological Survey in behalf of the Department of Agriculture, and public hearings were provided for at these yearly meetings.

It is doubtful whether a better plan could have been devised for prompt and well-considered action on proposed regulations. The Advisory Board served as an intermediary between the public and the Government, thus giving full and fair opportunity for the consideration of each year's program. Moreover, whenever an emergency arose requiring possible modification in the existing regulations, this Board could be called in special session.

Compare this prompt and cooperative procedure with what would happen if Congress formulated such regulations, occupied as it is with a multitude of other subjects, and largely indifferent to the consideration of many special problems, such as the conservation of wild life.

It was my privilege to serve on this committee for 18 consecutive years.

CHRONOLOGY OF EARLY MIGRATORY
BIRD LAWS

1. Introduction of Original Migratory Bird Bill December 5, 1904.
2. Enactment of the Weeks-McLean Bill March 4, 1913.
3. Treaty between United States and Great Britain for the protection of migratory birds, signed by the President August 16, 1916, and proclaimed December 8, 1916.
4. Act of Congress putting Migratory Bird Treaty into effect July 3, 1918.

The Migratory Bird Treaty and its Enabling Act supplanted the Weeks-McLean Act. Through this, protection was made effective over migratory birds throughout the United States and Canada. The constitutionality of the Treaty and the Enabling Act was decided in the affirmative by the United States Supreme Court April 19, 1920 (252 U. S. 416).

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HUNTING WILD LIFE WITH CAMERA AND FLASHLIGHT

GEORGE SHIRAS, 3^D



VOLUME I

HUNTING WILD LIFE WITH CAMERA AND FLASHLIGHT

GEORGE SHIRAS, 3^D



VOLUME II



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HARK!

Photograph by George Shiras, 3d

One of a group of four night pictures first establishing the beauty and accuracy of the camera and flashlight in big-game photography.

HUNTING WILD LIFE WITH CAMERA AND FLASHLIGHT

A Record of Sixty-five Years' Visits to
the Woods and Waters of North America

By

GEORGE SHIRAS, 3^D

Volume II

Wild Life of Coasts, Islands,
and Mountains



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This publication of the important wild-life researches of George Shiras, 3d, is made by the National Geographic Society as a contribution to its purpose—the increase and diffusion of geographic knowledge.

Introduction

THE preceding volume is devoted mainly to my observations during parts of many years in the Lake Superior region. The present volume goes farther afield and includes localities along the Atlantic coast from Newfoundland to Panama. My study and photography of wild life also led me along the Rocky Mountains of the West to the upper Yellowstone Lake region and to the Kaibab Plateau of northern Arizona. I also made visits to the southern coast of Alaska.

From 1876 to the present I have passed a part of each year in some section of the eastern seaboard of North America between the subarctic plains of Newfoundland, where ranges the caribou; and the rain-forest jungles of Panama, frequented by tropical spotted cats and monkeys. Coastal indentations taken into account, this region stretches more than 7,000 miles in length, and includes the fauna and flora peculiar to the several life zones from the Hudsonian of northern Newfoundland through the Canadian, Transition, and Upper and Lower Austral to one of the most strongly characterized parts of the Tropical.

From the time of the arrival of the early colonists, whether on the shores of Canada, the United States, Mexico, or Panama, to the present day, the chronicles of these regions have contained many references to the abounding wild life. The middle part of this coastal area has become the most densely populated section of the New World. Here are located numerous great cities and a well-settled countryside, but a study of the results of occupation of the region by civilized man for centuries shows surprisingly small effect on the face of nature as a whole.

It is true that the newcomers have cut down the forests, from vast areas, and have utilized the ground for agriculture, and that a number of large and noteworthy species originally inhabiting the region have disappeared, but these are species that apparently are unfitted to adapt themselves and survive in populous section. Among them may be mentioned the bison, elk, wolf, and mountain lion, which once roamed the forests of the eastern United States. With them have gone from this general region the great auk, Labrador duck, heath hen, passenger pigeon, and Carolina parakeet. Moose and caribou still hold their own in some of the wilder places, and a large number of species of wild creatures have adapted themselves to share their world with civilized man.

The white-tailed deer is probably now more numerous in some sections than at any previous time in its history. Within a radius of 300 miles of New York City, with its approximately 7,000,000 inhabitants, sportsmen during each yearly hunting season take more than 40,000 of these deer. In Pennsylvania their increase has been so great that on account of lack of sufficient forage the entire stock of deer has been threatened with starvation.

Probably the total number of small birds now found in the region has increased vastly since the days of the Pilgrim Fathers. This phenomenon is due to the increase of available food on farms and in second-growth forests. Millions of migratory wild fowl still troop southward every fall to winter in the coastal waterways and marshes, but unwise drainage operations and years of excessive drought have affected their welfare throughout this continent.

Many small creatures of field and forest have developed such an insight into man and his ways that they outwit him at times when their interests conflict. Cottontail, swamp, and snowshoe rabbits, squirrels, muskrats, beavers, minks, otters, skunks, foxes, raccoons, wildcats, and other small mammals, and even the black bear are common in many places. Doves, wild turkeys, ruffed grouse, and bobwhites continue to lure the hunter afield.

So far mention has been made only of the creatures of more northern latitudes, but excursions to the southward have brought me in contact with such tropical beasts as monkeys of several kinds, the jaguar, ocelot, yaguaroundi cat, coati mundi, peccary, tapir, prehensile-tailed porcupine, and anteaters, as well as with parrots and many other strange birds and a plant life so different that it constitutes almost a new world to the northern visitor. Here untamed nature surrounds man with a wall of persistent life ready to move in and supplant him wherever he ceases the constant efforts necessary to maintain his supremacy.

With so much of the original capital in wild life to go on, it is especially pleasing to note the awakening that has taken place among the people of the United States during the last 20 years in the recognition of the value of wild life as a great national asset that must be maintained and perpetuated. This change from a state of comparative indifference to one of interest has come about as the direct result of educational campaigns conducted for years by many organizations, among the most effective of which has been the National Geographic Society.

BIG GAME OF EASTERN CANADA

At the time of my visit to eastern Canada in 1906 and 1907, the amazing numbers of caribou in Newfoundland and their annual migration across the island each fall constituted one of the marvels of American wild life. At the same time, moose, white-tailed deer, and bears were extraordinarily abundant in New Brunswick.

Although this region had long been accessible to settlers, its unsuitability to agricultural development had resulted in vast areas being so sparsely occupied that they remained true wildernesses in which the native animal life thrived. There the sportsman or the photographer of wild things could establish his camp in ideal surroundings and feel himself in the midst of conditions almost like those of primitive days.

Conditions during the World War led to a period of intensive pursuit of big game in all this region for its value as meat. This slaughter of the moose, and especially of the caribou, dangerously lowered their numbers.

The migratory herds of caribou will probably never again troop across the barrens of Newfoundland in anything like their former numbers.

With well-enforced protection, however, the caribou in Newfoundland and the moose in New Brunswick and Maine may be maintained in fair abundance. Caribou seem to be disappearing forever from Maine, New Brunswick, and Nova Scotia, the white-tailed deer having taken their place in many districts.

Accounts of some of my experiences with the moose in the wild, forested parts of New Brunswick, and with the caribou on the lakes and barrens of Newfoundland, have appeared in articles in the NATIONAL GEOGRAPHIC MAGAZINE. My second trip to Newfoundland was for the special purpose of photographing migrating caribou as they swam across the large Sandy and Little Deer Lakes, which lay in the path of their regular route.

The survival of so much wild life along the eastern coast and its bordering hinterland is due chiefly to the physical characteristics of the country. To the north, in Newfoundland, Nova Scotia, New Brunswick, and Maine, are vast, thinly peopled, forested areas abounding in streams and lakes. There travel is still so largely by rough roads and small boats that conditions remain favorable to wild life. The rock-bound coast and outlying islets also provide homes for countless sea birds, just as do similar conditions on the shores of the North Pacific.

ONE COASTAL PLAIN

Beginning near the mouth of the Hudson River is a great coastal plain that extends southward to eastern Mexico. In the northern part it has a width of only a few miles; southward it broadens to 250 miles in places and narrows again near Tampico. In this entire area there are no outcroppings of metamorphic rocks and apparently none of sedimentary formation except the coquinas of Florida.

This plain is fronted by sand beaches penetrated here and there by bays, sounds, inlets, and the mouths of rivers. Back of the exposed beaches lie many great marsh areas and shallow bays, with numberless sand bars, low islands, and mud flats. In such places thrive aquatic plants and myriads of fishes, crustaceans, and other food that in winter sustain millions of swans, geese, ducks, gulls, waders, and other wild fowl.

Fortunately for these birds, the broken shore line and the extensive stretches of submerged lands have prevented the opening of highways, and have limited agricultural development. Large areas in Maryland, Virginia, North and South Carolina, Louisiana, and Texas are occupied only by fishing villages or by hunting clubs.

From Tampico, Mexico, south to Panama the coastal region is completely tropical, consisting mainly of an indented coastal plain broken here and there by mountains that sometimes rise abruptly from the sea, but usually stand at varying distances back in the interior. All this tropical region is sparsely occupied, the chief cultivated areas being the sugar and

banana plantations of Mexico and Central America. Much of the land is covered with forests in more or less primitive condition, some consisting of stunted arid tropical growth and others of the luxuriant rain-forest vegetation.

My five trips to the Rocky Mountain area were brief, but they gave me a much desired opportunity to become acquainted with the general characteristics of a region of superb scenic grandeur, with a flora and fauna so new to me that they were of absorbing interest.

Several trips to the Yellowstone Lake region, beginning in 1904, enabled me to see the southern part of that wonderland while it was still an almost unknown wilderness. There it was my good fortune to discover moose in surprising abundance, and I brought to the attention of scientists a previously unknown geographic race of this noble animal.

My visit to the Kaibab Plateau was for the purpose of investigating one of the best object lessons conservationists in this country have ever had of the results of the long-continued protection of large game animals in a large isolated area with no plan for eliminating the surplus. For years the mule deer were under rigid protection; then with the inevitable outcome of overstocking came the ultimate starvation of thousands of helpless victims.

My two visits to Alaska were first to secure photographs of the giant moose and the white mountain sheep of the Kenai Peninsula, and the second, made with my son, to become acquainted with the big bears for which the southern coast of that Territory is famous. Both trips were successful and the big bear secured proved to be a species new to science.

GEORGE SHIRAS, 3D.



A LITTLE WHITE, OR SNOWY, EGRET FLIES ALONG DAYTONA BEACH

Until steps were taken for its protection, this species seemed doomed to extinction, but now with plume hunters forbidden to kill it, it is slowly increasing in numbers.



WITH WHIR OF COUNTLESS WINGS THEY LEAVE A POOL IN LOUISIANA

On the bays and marshes of this State, Virginia, and North Carolina, a great proportion of the ducks, geese, and swans of North America pass their winters. Refuges have been provided for them, and they are quick to learn where safety lies.

CHAPTER I — PART I

Author's First Visit to Newfoundland

THE FALL migration of the great caribou herds in northern Newfoundland had become widely known. For many years hunters lined up along the railroad near Sandy River, intercepted the animals as they came southward, and killed them in great numbers. This easy method of destruction led to so serious a condition that to protect the herds from threatened extermination the Government closed to hunting an area extending five miles north of the railroad.

For some years I had felt a great desire to see and photograph these interesting animals and, in 1906, accompanied by several friends, I made a trip to the island to study their migration, as well as to try the famous trout fishing.

Newfoundland is the oldest British colony in North America, and it still maintains a colonial form of government. Its early history is involved in some obscurity, but trustworthy records show it was discovered in 1497 by John Cabot. During the 17th and part of the 18th centuries its history is little more than a record of feuds between the English and French fishermen.

In shape the island resembles an almost equilateral triangle, about 315 miles on each side, and it contains an area of about 40,000 square miles. It is separated from Labrador on the north by the straits of Belle Isle. Since 1909 a part of the Labrador coast and the Island of Anticosti have been included within the jurisdiction of the Newfoundland Government. -

A LAND OF RIVERS AND MOUNTAINS

The surface of the island is diversified by mountains, marshes, barrens, ponds, and lakes, some of the mountains towering to 2,000 feet. It is estimated that one-third of the surface is covered with fresh water. The coast line is everywhere deeply indented with bays and estuaries, many of them spacious enough to harbor the whole British navy. Most of the narrow, winding rivers flow from interior lakes, and are navigable only for small boats.

While much of the soil is sterile and unproductive, there is considerable arable land along the seaboard. The best timber grows in the interior, and consists of pine,

fir, poplar, and birch, with a lesser growth of willow. There are no decided extremes in climate, the temperature varying from about zero during the coldest winter to 80 degrees at the height of summer.

Most of the people are employed in the fisheries and live along the coast, where cod, salmon, and herring are abundant. The main fisheries are on the "Banks" offshore, which form the greatest submarine plateau known, and constitute one of the most famous fishing grounds in history. The seals afford an important fishing industry of the island, the season on them beginning usually about the first of March.

BY RAIL TO SANDY RIVER

Our party of four arrived at Port-aux-Basques, at the southwest corner of the island, on the morning of September 6, 1906, and we were soon traveling away from the rock-bound coast on the narrow-gauge railway, which crossed Sandy River, our immediate destination. En route we were joined at Bay of Islands by two sturdy guides, who as erstwhile fishermen were experienced in handling small craft on swift waters. At the river crossing our party was increased by two additional guides, each famous as a trapper and caribou hunter.

The journey by rail disclosed scenery new to most of us familiar with a more forested and occupied country; for the train wound its way through valleys through which dashed streams notable for their salmon pools, or over rolling hills and across tundras dotted with high mounds and pinacles of jagged rocks which often served as landmarks in a vast interior lacking trails or human habitations.

We left the railroad and camped the first night on Sandy River, a short distance above Grand Lake, the largest and most beautiful body of water on the island. It is 56 miles long, 5 miles wide, and more than 300 feet deep, and contains an island 22 miles long. From this point a trip by canoe would take us through streams and lakes to within a few miles of the northern boundary of Newfoundland, where some small islets, a short distance offshore, were the last haunts in America of the great auk.



THE PAUSE FOR LUNCHEON WAS IN DELIGHTFUL SURROUNDINGS

Many inviting places for landing were seen as the party ascended Sandy River (see text below).

From the first camp on Sandy River we were to ascend the river to an upper chain of lakes in three canoes and a bateau manned by local guides to carry our camp equipment and supplies. While the boats were being loaded, my Michigan guide, John Hammer, and I took our own canoe and started on the way.

UP THE RAPIDS TO CAMP AT LITTLE DEER LAKE

The river was swift in many places, requiring strenuous paddling, but it was not until we reached the foot of a long, tumultuous rapid that we had any doubts as to the result. Halfway up, our headway decreased until the canoe became stationary, and every prospect pointed to our drifting back when we should become exhausted. With some effort we worked the canoe ashore, where in the eddy below a large boulder we awaited the arrival of the others.

As they came to the foot of the rapids, they substituted poles for paddles and came steadily upstream, apparently with no great exertion. When they arrived abreast of us, the guides showed much amusement at our predicament, saying that no one had ever

succeeded in paddling up these rapids and that we should have used our poles.

On being told that our canoe contained none, they supplied them. We reached the head of the rapids in a state of exhaustion. Except possibly in New Brunswick, there are no more skillful canoeists than those of Newfoundland.

On our return several weeks later we shot down the rapids at high speed. At their foot we found an overturned canoe that had capsized when two visiting sportsmen, trying to use poles on the way down, had thrust them into deep water at the foot and, finding no bottom, had gone overboard. Aside from the ducking, they had suffered no injuries, but had lost a part of their outfit, including a camera and two guns. We had tried paddling up, and they had improperly used poles in going down, a procedure that showed that each party had something to learn in navigating new waters.

We camped for a week at the southwest corner of Sandy Lake. Back of camp a long stony ridge was bright with blueberries, and a small stream nearby supplied the camp with brook trout. This lake marked the center of the caribou country,



NAVIGATION AT THE FOOT OF THE RAPIDS ON SANDY RIVER REQUIRES SKILL

On the trip into caribou country the camp equipment was carried in a stout skiff (see text, page 2).

but as the migration at this date was limited to a few does, fawns, and yearlings, I had little expectation of much success with the camera.

Only one member of the party had taken out a hunting license, since at that season the large stags had not started on their migration, nor were their antlers fully developed. It was our intention to make use of this permit later, on a trip to be made in November, but the holder of it agreed to shoot a young stag for camp use. With this object in view he went out one afternoon on the extensive barrens near the lake.

A PERSISTENT ORPHAN

After an hour or two we heard a shot, and since this was the first big-game hunt this man had ever undertaken, we waited expectantly. When the hunter returned, he seemed much flustered. He told us that he had shot what appeared to be a two-year-old stag, but on examining the body he had found it to be a doe bearing small antlers. He had been unaware that most female caribou in Newfoundland and elsewhere have this usually masculine emblem.

A few minutes later a fawn had come out of the brush and had begun whimper-

ing over its mother's form. Much distressed at this sight, he had driven the little creature away, but it had persisted in following him most of the way to camp.

While telling the story he suddenly exclaimed, "There it is now!"

The little orphan seemed more curious than alarmed, until we all joined in a chase to relieve our friend of its unwelcome presence. For several days the waif was seen near camp, and then we were pleased to see it adopt a foster mother, a doe that came swimming near the beach upon which it stood.

Two months later our despondent companion killed several fine stags, and this served to lessen his chagrin over the tragedy of his first hunt. These he shot on November 15 near the southern end of the island, where he saw about 400 adult caribou stags temporarily consorting together after the close of the mating season. The larger antlers were being shed as evidence of an armistice between former rivals. This occurrence takes place from one to two months earlier than is the case with moose, white-tailed deer, or elk.

The female caribou, however, carry their small antlers throughout most of the win-



THIS CARIBOU MADE AN AGONIZED RUSH TO ESCAPE THE CANOE

The animals swim slowly in deep water, but go ashore with great speed (see, also, illustration, page 6). They are of the species known in Europe as reindeer.

ter. In connection with previous observations of the shedding of the velvet, it should be stated that these caribou do not "horn" the trees and bushes until after the antlers are free from velvet. Additional evidence is thus presented that the rubbing of trees is a sexual manifestation, and that it is not for the purpose of removing the velvet, an effort that would have proved futile, considering the massive and intricate character of the antlers of these animals.

The caribou use the long sharp hoofs of the forefeet for digging down into the snow after ground vegetation, although the animals are largely dependent in winter on a dark gray lichen that festoons many of the conifers. The hoofs, when spread open, support the caribou on the crusted snow or, in the summer, on bogs that would mire any other large quadruped.

Whenever we paddled close to a swimming caribou, as we journeyed together across the lake, the animal displayed little apparent concern, but it became very evident that deep down in its heart was an inherent dread of man. Upon finding footing in the shallow water near the shore it would plunge forward with all its remain-

ing strength in a deluge of spray that sometimes concealed it from the camera. Since caribou are lacking in facial and vocal expression, their emotions can be discerned only by their quick and nervous movements when confronted with danger or when suffering pain.

NEWFOUNDLAND CARIBOU AND KIN

Caribou is the American name for the member of the deer family known in the Old World as the reindeer. Beyond the northern boundary of the United States, caribou are found in most of the Canadian Provinces, in Alaska, and on nearly all the larger arctic islands. At one time there was a considerable number of them in New Brunswick, in Maine, along the northern shore of Lake Superior, in Minnesota, and in the more northern Rocky Mountain States; but the ease with which these animals are killed, and the recent occupation of their more southeasterly range by moose and white-tailed deer, have almost eliminated them from those areas.

Scientists have described a number of so-called species of caribou in different parts of northern North America; but from



YOUNGSTERS AND FEMALES BEGIN THE FALL MIGRATION

These two yearlings were photographed while crossing the lake. A small band of does and fawns was landing on the opposite shore.

the information now available it seems probable that eventually it will be proved that there exists on this continent only one species, which has been modified by environment into numerous geographic races, or subspecies.

One of these is the caribou that occurs in Newfoundland. The term "Woodland Caribou" is loosely applied to the animals that live in the forested regions of the northern United States and Canada to distinguish them from those called Barren Ground Caribou that inhabit the treeless Arctic tundras of the North. No definite boundary can be found between the two forms.

CARIBOU VARY WIDELY IN SIZE

Caribou vary in size in different regions. Those found in Newfoundland belong to one of the larger races. The stags weigh from 200 to more than 300 pounds; the does are much lighter. The antlers of the stags are large and widely spread, making handsome trophies. These animals, however, are smaller than the great caribou of the northern Rocky Mountains of British Columbia, and have smaller antlers. The

caribou is the only member of the deer family in North America in which the does grow antlers, but these are very small and slender compared with those of the stag.

Newfoundland caribou live almost continuously in open country, over which their trails extend in all directions. In summer, when bothered by flies, they hunt the seclusion of arboreal thickets during the day and come into the open only at night. When not driven to cover by insects, they feed mainly on reindeer "moss" and other plant growth of the open tundras. On several occasions in the fall I saw caribou bed down there at nightfall and found them in the same places in the early morning.

Those who know the Newfoundland caribou only in the fall hunting season may gain the impression that they are always gregarious, since at that time most of them move south in herds of various sizes, sometimes numbering 100 or more, and on the winter feeding grounds they are often massed, not unlike elk. After the spring migration the herds separate, and the caribou may be found singly or in little family parties.



HOWEVER SLOWLY HE SWIMS IN OPEN WATER, HE GOES ASHORE FAST

At the approach of the author's canoe, this caribou made for land with frantic speed (see, also, illustration, page 4).

On several nights I skirted the shore of the lake at the Little Deer Lake camp, hoping to get flashlight pictures of the animals, which I knew were nearby in considerable numbers, but I encountered not a single one. This failure to feed at night appears in strong contrast to the habits of other deer which feed so commonly at night, especially on aquatic plants on the shores of lakes.

Bot flies are terrible pests to Newfoundland caribou in summer. Apparently two species of these insects attack them, one filling the skin of the back with grubs, which perforate it, and the young of the other infesting the animals' throats.

So far as I could learn, the main rutting season of the caribou on the island occurs between October 1 and 25; the single fawn is born in June, eight months later.

MIGRATION OF CARIBOU

The seasonal migration of caribou almost throughout the American range of this animal is more marked than that of any other game animal. These migrations occur independently in different regions, some of them involving the movements of hundreds of thousands of animals. Al-

though the area traversed in Newfoundland is much more circumscribed than that in some of the continental regions, and although the seasonal differences in temperature there are unusually limited, the migration is pronounced.

THEY THRIVE IN RIGOROUS CLIMATE

The equable climate and moist winds from the surrounding ocean produce a good growth of varied vegetation, including conifers, willow, birch, poplar, mosses, lichens, grasses, and many herbs and aquatic plants. The subarctic climate and prevalence of boggy country seem especially suitable for caribou; and it is doubtful that any other members of the deer family would thrive there, except possibly the moose, in the southern half of the island. There, however, the dampness of the climate might prove a serious obstacle to their welfare.

One day in September we saw a well-antlered doe and her fawn swimming diagonally across Sandy Lake on their migration. We paddled swiftly to head them off before they landed. As the canoe sped along, the two did not change their course, but continued straight ahead. They would

necessarily have to pass directly in front of our craft.

When we were within a hundred feet of them, the fawn became restless and finally rose half out of water and struck the mother's flank with its front feet. Thereupon the doe half turned her head and then redoubled her speed.

When we were close enough to take a picture, we saw that the right eye of the doe had been destroyed. Doubtless this injury had been caused by the thrust of a dead branch.

On reaching the shore the doe easily jumped over the sagging trunk of a mountain ash, which had been pulled down by bears feeding on the berries; but when her offspring attempted the same feat, it hung partly suspended for several minutes.

A MOTHER CARIBOU DESERTS HER FAWN

Meanwhile the mother continued on her way and disappeared in the forest, apparently indifferent to the plight of her young. On regaining its footing and finding itself deserted, the fawn returned to the lake shore, where it was seen wandering about aimlessly for several days.

When a white-tailed doe is separated from her young, she will circle again and again until she finds the fawn. This apparent indifference of the caribou doe may account partly for the scarcity of fawns in Newfoundland.

At one time timber wolves were a menace to the caribou in Newfoundland; for on such an island there was no escape from these persistent pursuers, either in summer or winter. A large bounty having been placed on them, the trappers soon reduced their numbers, and at the date of my visit they were supposed to be extinct. A nature fictionist, who was salmon fishing in Newfoundland about the time I was there, devoted much space to describing his adventures with the wolves on the island, some of which he declared he had followed day after day.

These animals are known to be almost wholly nocturnal. My guide, Squires, told me that no bounty had been paid for scalps in 15 years, and that during his guiding and trapping in the interior, where he lived throughout the year, he had seen no wolf tracks for many years, and believed the last one had been trapped or poisoned.

On the other hand, silver-gray, black, cross, and red foxes were frequently seen

in the daytime, following the shore in search of sticklebacks cast up by the waves. After the wolves had been exterminated, poisoning was prohibited in the taking of other fur-bearing animals, for it had long been recognized that a large percentage of the poisoned animals were never found. To this wise law may be credited the abundance of foxes.

Once, when seated on a knoll back from Little Deer Lake, hoping that a caribou would pass on the trail just below, I observed four silver-gray foxes feeding on blueberries at the foot of the slope. Although my companion had a rifle, we left these beautiful animals undisturbed in the hope that one or more might come within photographic distance.

Finally three of them departed for their burrow, but we knocked over the fourth with a rifle ball as it started to leave, and later presented its handsome pelt to the Biological Survey in Washington. The following day I saw a fox on the beach, and by hiding behind a rock obtained its picture.

On a stream not far from camp was a large beaver house with a dam just below it. While I was trying for a picture of these wily animals, Squires told me of his own original method of taking many beavers. On the opening of the season he would secrete himself close to a beaver house and, after waiting a few minutes, would lean forward in the bushes and strike a resounding blow on the surface of the water with a paddle, exactly duplicating the sound made by a beaver's tail when the animal used it to signal alarm.

BEAVERS MORE ALARMED BY TRAPPING THAN SHOOTING

After a few minutes of silence up would come the head of an inquiring member of the resident beaver family intent on driving away any intruding beaver. These animals do not cultivate friendship among their neighbors. A shot through the head would instantly kill the curious animal. After its body had been recovered, the performance would be repeated until sometimes four or five would be killed at the same place in the course of a few hours.

Squires explained that beavers are not frightened by rifle shots in the vicinity of their lodge. When one is trapped, however, its death struggles in the water may alarm the remaining members of the family



LITTLE DEER LAKE, SANDY RIVER DISTRICT, NEWFOUNDLAND, IS TYPICAL
Here and at Sandy Lake the author had opportunity on his second trip to study the habits of caribou in swimming such bodies of water lying across the course of their migration.



SUNLIGHT MAKES A GOLDEN PATH ACROSS THE LOWER END OF SANDY LAKE

The stony ridge shown in the background was a much used route for migrating caribou, which crossed the river at the outlet of the lake. The set camera, placed on the animals' trail on the ridge, caught several pictures.

to such an extent that they may permanently desert the house.

Once we saw a bear working in and out of the bushes along the shore of Sandy Lake and heading toward the trail leading from our tent to the water's edge. Leaving the guide to watch, with instructions to whistle whenever the bear came near, I retired to continue an interrupted luncheon.

In a short time I heard a low whistle and hurried out, only to find that I had been deceived by the call of a Canada jay. Again I retired from view.

TRICKED ONCE BY A JAY, THE AUTHOR
MISSES A BLACK BEAR PICTURE

Within a few minutes the whistle sounded several times. I attributed it to the bird and ignored it for some time; then peeping out of the tent, I saw the guide crawling along the trail, waving his arms excitedly. Running down to the shore, I came upon the bear where it was sniffing at the canoe. I was so close that he dashed into the bushes and escaped a shot from the camera, evidently believing that the usual bullet was in store for him. The bear had come out of the brush only about 100 feet away, and the guide had whistled repeatedly as instructed without receiving any response on my part.

The disappointing experience recalled to my mind several others I had had with the mischievous Canada jay. But there are many difficulties in camera hunting not occasioned by such deceptions.

Once, in the western United States, I found the carcass of a buck that had been killed and partly eaten by wolves on the shore of a small lake. As I paddled back down the lake some time later, I saw a large black bear feasting on the remains, its head and shoulders showing plainly above the antlers of the deer. It was a remarkably fine opportunity for a picture and I drew the slide and made a hasty focus and exposure.

Quick as I was, however, the bear was quicker. It sensed the approach of danger and scuttled for cover.

The picture, unfortunately, recorded only a view of the animal's broad posterior as it disappeared in the bushes. Every wild-life photographer sooner or later has such exasperating disappointments; but if success were always assured, the sport of hunting with the camera would lose much of the appeal of its uncertainty.



THE CAMERA CAUGHT A BLACK REYNARD

Red foxes were common about Sandy Lake, and black and cross varieties appeared repeatedly (see text, page 7).

Passing much of the time on or near the water, we had a chance to see the Canada geese that, in family groups, visited the neighboring hillsides for blueberries, which at that time of year seemed to be their mainstay. Because of the moist climate of this region, great clusters of berries remain on the bushes until October, at which time the hunters dig them out of the snow for camp use.

ANIMALS ENJOY BLUEBERRIES

These berries, the toothsome morsels enjoyed particularly by black bears, are sought eagerly by many wild creatures. In Alaska native eskimos preserve in seal oil large quantities of a similar wild fruit, the huckleberry, which grows in profusion on hillsides and in mountain valleys near the coast.

Earlier in the season, when the adult geese were moulting, it was the custom of the natives to drive them ashore, where they were easily captured. I observed a number of such captives about cabins, where they were fattened for a Christmas feast or for selling as live decoys to the wildfowler from the States.



MIGRATING CARIBOU SWIM SANDY LAKE, NEWFOUNDLAND

Because of their heavy coat of long, tubular hairs, they ride high in the water, but not so fast as either moose or white-tailed deer. In the water they carry their tails erect.



MIGRATING CARIBOU FOLLOW A SET SCHEDULE

Young and old, singly or in squads, the animals travel between 9 a. m. and 4 p. m. In order to detect danger ahead, they move against the wind (see text, page 13).

CHAPTER I — PART II

Second Newfoundland Trip

AS MENTIONED in the account of my trip in 1906, I passed pleasant weeks with congenial companions, fishing, canoeing, and camping on the interior lakes and rivers of Newfoundland.

It was not until the latter part of September, 1907, however, that I made a special trip to that island to study the caribou, and particularly to obtain photographs of them as they were crossing several lakes on their route when migrating.

CAMP ON A CARIBOU MIGRATION TRAIL

Accompanied only by a native guide, William Squires, who had been with me on my previous visit to Newfoundland, I traveled by canoe up Sandy River to Little Deer and Sandy Lakes. Our camp was located at the outlet of Little Deer Lake, which, with Sandy Lake, formed an east-to-west base line of more than nine miles across the southerly line of migration.

Here, on the day following our arrival, a fine stag, an antlered doe, and a fawn plunged into the water, and, looking neither to the right nor the left, began their long swim across the lake. In a few minutes our canoe was by their side. Raising their heads, previously held close to the water, they made a gallant effort to outstrip us, their stubby white tails held erect like flags of truce. After photographing them, we permitted them to continue their travels.

While studying the caribou in this locality, I was surprised to note the small number of fawns, compared to the adult does, as disclosed by my own close observations and those of several others. My records of more than 300 does show an average of only one fawn to four does.

This condition is in striking contrast to the case of the moose and the deer in other regions, which, though they usually have two young each, are more or less harassed by the timber wolf and cougar. In Newfoundland man is the sole enemy of the caribou, for the wolves, once numerous, were extinct at the time of my visit.

This proportion of caribou fawns held true under a great variety of circumstances. Three does out of every four were barren. In a group of four does there would be only one fawn or none; in one band of 16 does

crossing the lake in single file, I counted only four fawns, and in larger herds the young were equally scarce. While this may be due to the extremely damp and rigorous weather in the spring when the fawns are born, or to the peculiar habit of single stags of rounding up great herds of does each fall, the fact seemed to be that the Newfoundland caribou fawns are far below the average of the young of other antlered game on this continent.

It may be, however, that during migration females with young fawns prefer to make a detour about the lakes instead of swimming across them, and thus where we located, barren does, yearlings, and stags were more likely to be seen. Moreover, the fact that many does migrate to the southern end of the island a month in advance of the rest necessarily curtails the opportunity for mating.

If my inferences are correct, the great necessity for proper game laws on this island is obvious, for once these great herds of caribou become greatly reduced in numbers, the process of restoration will be extremely slow.

SWIMMING SPEED OF CARIBOU

Another matter upon which I may express an opinion, although it differs from statements made by F. C. Selous and other well-known sportsmen who have hunted on this island, concerns the supposedly great speed of caribou in swimming. When undisturbed, a single caribou crossing a large lake makes about three miles an hour, and a fair-sized herd is somewhat slower.

When first sighting a pursuing canoe, the animal springs half out of the water, and then, with head erect, tries to distance the paddlers. For the first one hundred yards its speed varies between five and six miles an hour; then, the caribou becoming somewhat exhausted by the extreme exertion, slows down to about three and one-half miles an hour—a rate that a single paddler in a loaded canoe has no trouble in exceeding. The swimming speed of this animal, as I have observed it in the wilds on many occasions, is below that of the moose and the white-tailed deer.



A STAG, A HORNED DOE, AND A FAWN SWIM SANDY LAKE

About one in two or three female caribou in Newfoundland have antlers. These animals were so strictly diurnal in habits that they did not give any opportunity for flashlight pictures.



IN UNION THERE IS STRENGTH

Caribou in groups usually swim compactly; the suction helps those in the rear. It must not be supposed, however, that such close companionship is the rule with these animals on land.



THIS CARIBOU STAG HAS FINE ANTLERS

Swimming high, as is the custom of his species, he keeps them out of the water.

I saw no caribou enter the water before 7 o'clock in the morning, or later than 5 in the afternoon; the migration was at its height between 10 a. m. and 3 p. m. These animals, as a rule, are not nocturnal, either when migrating or when feeding, although during the fly season they feed at night, and late in the fall under the stress of heavy snowstorms they sometimes travel night and day.

CARIBOU DIFFER FROM DEER IN HABITS

In color the caribou so closely resembled the water as they swam the lakes under dull autumnal skies that the heads and bodies were not visible at a great distance, the gleaming white of their stiffly upright tails often appearing at first glance like a little flock of gulls. Unlike the other members of the deer family with which I am familiar, caribou, when they come to a body of water on their travels, sometimes burst through the bordering bushes and plunge into the water with a splash so great that it may be seen more than a mile away.

It is characteristic of Newfoundland caribou to depend on scent rather than on sight or hearing to detect danger. Because of this, during the fall migration they

nearly always move south against a south wind. Generations of experience have taught them that they can discover and avoid any danger that may threaten them up the wind when they follow this course, whether the danger be from the dreaded wolves that were once numerous or from the hundreds of hunters who lie concealed along the trans-island railway or in the passageways between numerous lakes.

Most of these hunters are islanders out to lay in a supply of much needed winter meat, but others, often from the United States, are after the prized antlers of big bulls for trophies. The caribou, being headed up the wind, the telltale scent of an enemy can be detected at a long distance, but without such aid the animals may pass within a few yards of a man who is only slightly concealed.

It is this dependence upon scent that impelled the migrating animals to persist along their up-the-wind course even when headed off by a pursuer in a canoe when they were crossing water. They would try to pass the boat on one side or the other, or would coast along shore until they could get back again on the course. Their persistence in this was greater than I have ever seen exhibited elsewhere by man or beast.



A NEWFOUNDLAND COW CARIBOU PHOTOGRAPHS HERSELF WITH HER CALF

The camera was set with a string crossing the trail used by these animals in their fall migration. It was here that the French trappers sprang the apparatus and thought it was a set gun (see text, page 17).

Newfoundland is visited each fall by numerous nonresident sportsmen in quest of stags with fine heads, and it is difficult to estimate the amount of meat abandoned each year on account of the remote location or because of the rankness of the flesh of the stag.

On my second trip to the island, I met three young collegians from the "States," who several days previously, on the barrens east of Grand Lake, had encountered a number of migrating caribou, and by good judgment and accurate shooting had, in a single day, picked out and killed nine large caribou stags—the three apiece allowed by law. They candidly admitted that, owing to the toughness of the flesh of the stags and the distance from their camp, they had abandoned every ounce of the flesh, aside from the heads, thus wasting a total of more than 3,500 pounds.

Yet these young men had come thousands of miles for caribou hunting and were

in every respect a manly set of fellows. After seeing some of my caribou pictures and hearing incidents connected with the obtaining of them, they seemed to realize that big-game hunting with the camera is an ideal method and one that they hoped to try thereafter.

HUNTERS LEAVE LARGE QUANTITIES OF FLESH TO ROT

As with the caribou stags, so it is with bull moose, bull elk, and gigantic grizzly bears. Year after year their decaying flesh is left to pollute the air of some beautiful valley, simply because the antlers or the hide was all that could be saved when these great animals were stricken in their remote haunts.

While I was at Little Deer Lake on this trip, a weasel in its brown summer coat came almost daily to the camp, looking furtively about, and carrying off scraps of meat. The day following the first snowfall

a weasel of the same size appeared in a dainty white coat. This indicated an extraordinarily rapid change of color, if it was the same animal.

A passing Indian trapper declared a weasel can change its color overnight. His accuracy is doubtful, for these seasonal changes are known to be gradual and due to a moult. The process may be hastened, however, by favorable weather.

PROTECTIVE COLOR PROBLEM DIFFICULT

The theory of concealing and revealing coloration has always been controversial, extremists on either side falling into error through an insufficient understanding of a complicated problem. Unquestionably, color and shape often become important factors for defense or offense.

In the north the seasonal color changes of the varying hare, certain species of lemming, the weasel, and the willow and the rock ptarmigans seem to be of a purely protective character, the dark colors suiting the summer and the white the winter season. In accord with its usual surroundings of snow and ice, the polar bear remains white throughout the year.

The chameleon and certain tree frogs and fishes afford good examples of color control to blend in harmony with their surroundings, this faculty being useful in capturing their prey and in avoiding their foes. In the temperate regions of America most of the large game animals are not protectively colored, possibly because their original foes were the wolf and the puma, the former hunting by scent and the latter by dropping on its victim from an elevated vantage point or by other catlike methods.

The invention of the gun has been too recent for nature to provide its victim animals with anything of a protective character. Many animals and game birds, however, have changed their habits to meet new conditions. The wild fowl now often feed at night; the ruffed grouse seldom sit rigidly in a tree on the approach of the hunter, but take flight; and the bears, wolves, foxes, and antlered game avoid the daylight hours or feed in the seclusion of forests and swamps.

The caribou of Newfoundland are visible for miles in the open, and have neither a sensitive ear nor a discriminating eye. As has been indicated, they depend upon scent to detect man or wolves, which once roamed the island in large numbers.

From the viewpoint of the big-game hunter, caribou are stupid animals, and until they have learned to depend upon vision they cannot be expected to thwart the gunner. Their security now lies mainly in their occupying the remote and wilder portions of the country, their chief peril arising during the southern migration. Most of the larger stags no longer migrate, preferring safety to a change of scenery or surroundings. The trophy hunter must seek them in their remote recesses if he desires to obtain an exceptionally fine head.

When the limited range and the mildness of the winter climate throughout Newfoundland are considered, the instinctive habit of the caribou to migrate each spring and fall does not seem justified, unless it is necessary on account of food. With a diminution in their numbers, these animals may eventually avoid the perils of such seasonal movements by remaining throughout the year in secluded areas.

As noted previously, such a cessation in migration occurred in 1885 in the case of the white-tailed deer along the southern shore of Lake Superior.

NO FLASHLIGHTING OF CARIBOU

On most of my trips after pictures of animals, big or little, I had come to rely largely on the flashlight as a necessary adjunct when paddling about in a canoe at night or when using the set camera in places frequented by prowling animals after dark. This made available most of the 24 hours and thus greatly enlarged the opportunities.

Except during the fly season, the caribou, unlike the rest of the deer family, are diurnal, rarely moving about at night even to feed. Consequently, my flashlight apparatus could not be utilized in this northern region.

During this second visit the sun was low on the horizon even at midday, and there were only about six hours of light sufficient for photographing rapidly moving animals. Time, therefore, often hung heavily on my hands. Night excursions on placid waters, beneath twinkling stars, and amid shifting shadows of the bordering forests had always been entrancing, regardless of luck with the camera, and I greatly missed them.

Though I felt rather positive from previous observations that caribou do not migrate across the lakes at night, I deter-



THE CAMERA WAS SET FOR CARIBOU

At this spot several excellent pictures were obtained (see, also, illustration, page 14). The migrating animals took their own photographs by touching a string stretched across their trail.



A NEWFOUNDLAND WEASEL IS A WARY FELLOW

These quickly moving little animals are difficult to photograph by day. The author encountered an Indian trapper, who said they can change color overnight (see text, page 15).

mined this to my own satisfaction by obliterating each evening all tracks of animals that had come ashore in the day. The following morning I never found any fresh tracks.

Being thus satisfied that there was no chance for flashlight pictures, I set out a daylight automatic camera on a long, stony ridge that formed the southern boundary of Sandy Lake, where a well-used caribou trail offered prospect of success.

TRAPPERS TRAPPED

Any opportunity to obtain a photograph the first day was spoiled by two French trappers who walked into the string connected with the concealed camera. On their return to our camp that night they related their misadventure. It appeared that they had sprung the automatic camera as they traveled along the trail.

The pressure of the string and the click of the metal shutter had suggested to them a set gun that had fortunately missed fire. Terrified, they had fled precipitately, with the string entwined about their legs. On returning to investigate, they had discovered the cause of their alarm.

Such an incident seemed to indicate that these swarthy trappers were entirely familiar with the use of the set gun, a reprehensible method that has been practically outlawed in all countries, it being regarded as equally dangerous to man and beast.

The following day I was rewarded with a good picture of a doe and a fawn traveling the runway. Their heads were lowered and they were sniffing the ground, a circumstance that suggested that they had perceived a trace of human scent in the vicinity of the camera.

On the next day, when the sky was overcast, the camera was sprung by a caribou, so dark in color by reason of insufficient light, that it resembled a domestic cow. It was difficult to determine from the antlers whether it was a young stag or an old doe.

The next day we moved our camp, but not before it had been satisfactorily determined that the set camera could be used in the daytime for obtaining pictures of caribou migrating on some of the many trails to supplement those of the swimming caribou that had so largely engaged my attention.

One of the special objects of my second trip to Newfoundland was to obtain photographs of the herds of great antlered stags as they brought up the rear of the fall

migration. For some days late in October, as the time for my necessary departure approached, we looked for a snowstorm that would start the big fellows on their way south. The continuation of moderate weather was discouraging, and with only two days left before taking the steamer from the island my chances of seeing a migration of large stags seemed slight.

A heavy snowstorm, however, began at noon on the next to the last day of my stay, and Squires prophesied that the next day I would use my last plate. He felt certain that the caribou would come through by the hundreds.

On the following morning I arose expectantly and dug out a trail to the lake shore, where I sat all day without seeing a single caribou. Since the snow was nearly two feet deep, my guide expressed the opinion that with all the runways obliterated, the animals were probably delayed in opening up the trails they had followed for centuries.

REASON FOR THE HALTED MIGRATION

His conclusion seemed reasonable, except that a north wind was blowing at the time, and I felt certain that these caribou migrate in fall only against a south wind. That the direction of the wind had halted the migration appeared to be the real explanation; for the next morning the wind came again from the south, and while we were breaking camp and loading the canoe in a heavy rain we saw the moving caribou crowding the opposite shore.

The fixed date of my departure and the heavy rain argued against any change in plans. I have ever since regretted this decision.

During the several hours required to go down the river I saw more caribou than the total number observed previously on this and my former trip. The heavy rain rendered successful use of the camera impossible, and it was most provoking to see dozens of caribou swimming within a few yards of our canoe.

At one point on the river we noticed smoke curling up in front of a small tent. Going ashore, I was pleased to find my old friend, A. Radcliffe Dugmore, who even at that time stood in the fore front of wildlife photographers. His mission was the same as mine had been, and I assured him that he had come at exactly the right time. With this he agreed, adding that for several



SHE FOUND A SAFE HAVEN

This doe caribou is going ashore at Little Deer Lake. The photograph shows a typical wooded belt bordering the water in northern Newfoundland. It was taken after a late September storm when the snow quickly disappeared.

hours hundreds of caribou had been crossing the river in sight of his camp, and that he was ready to begin the bombardment the next morning should the rain cease.

When I met him several months later, he spoke of his trying experiences. In an effort to use a motion-picture camera and a still-life one from the same blind he had suffered "buck fever," so that his results had proved unsatisfactory. He said he was going back the following year with the expectation of doing better.

That trip he made just before going to Africa, and obtained a series of caribou pictures surpassing any ever taken before. His successful endeavors are recorded in a volume entitled "The Romance of the Newfoundland Caribou," the text of which is as informative, as the pictures are accurate and beautiful.

At the railroad track I met a Boston sportsman preparing to start up the river. He asked if I had obtained any good heads, and I answered in the affirmative. Thereupon he looked in the canoe but saw no evidence of any such success.

Knowing what was passing in his mind, I explained, with some hesitation, that I had been photographing, not shooting, caribou. Upon hearing this, he called me by name, and when asked how he knew it, replied, "Why, you are the only darned cuss who would come so far for game pictures." Then, apologizing for such a greeting, he added that he also had a camera and would prefer to bring back pictures rather than heads and hides.

THE WHISKEY-JACK

For the caribou hunter, who often spends much time searching through binoculars for the roaming game, one diversion is observing the Canada jay, sometimes called camp-robber, meat-bird, or whiskey-jack. In color, shape, and habits it often reminds me of the Florida jay. It is bold and extremely tame, sometimes eating from one's hand on first acquaintance. Nevertheless, it prefers the wilderness, away from the permanent habitations of man.

No sooner is the hunter's tent erected in the haunts of these birds than one appears, followed soon by others. In Newfoundland



THE AUTHOR SNOW-CAUGHT IN CAMP AT LITTLE DEER LAKE, NEWFOUNDLAND

The first snowfall of the season caught the party late in October and started the main migration of caribou stags, which occurs later than that of the does and fawns. The tent to the left was the temporary quarters of two French trappers.

I took pictures of the Canada jays as they perched on the camp tables or on top of the tent, and of one as it was lifting a piece of venison from a sizzling frying pan. A special eating place consisting of a tin plate on the end of a box by the camp kitchen was provided for these birds. The plate had to be replenished frequently (see page 21).

A saddle of caribou proved to be a great attraction for a pair of jays and their three young, which kept busily at work filling their bills with suet and concealing it in crevices in the bark of trees for a winter cache. In later years I renewed my acquaintance with these entertaining camp companions in the Rockies and in parts of Alaska.

Both in Alaska and in Newfoundland trappers told me that the Canada jay nests in February. Although their nests are warmly lined, continuous incubation of the eggs and brooding of the nestlings until they are well feathered are necessary. Just why these birds should select for nesting zero weather when the food supply must be greatly restricted, is one of many difficult problems of bird life.

When we reached the railroad crossing, the rain had nearly ceased, and preparations were made to put up our tent for the night, for the train to Port-aux-Basques did not arrive until morning. This tent, of heavy coarse canvas, was thoroughly saturated inside and out, having been used for covering the outfit on the run down the river, and the ground near the railroad embankment was soft and muddy.

Squires suggested that we continue a mile down the river to the place where it entered Grand Lake, at which point there was a large and comfortable log cabin we could occupy, and return after daybreak in time for the train.

DEMOCRACY OF AMERICAN SPORTSMEN

On reaching the cabin we found a tent alongside it occupied by two guides, and within the cabin a titled Austrian sportsman. He greeted me pleasantly and invited me to share the cabin, which was owned by a hotel company for the use of its guests. My guide, he said, could put up the tent for his own use.

This large cabin had comfortable accom-



A CANADA JAY APPROPRIATES A HAUNCH OF VENISON

In the north country of Newfoundland the "whiskey-jack," or camp robber, makes himself free in almost every woodland camp. He is an arrant freebooter, and his confident and tricky ways cause amusement and sometimes exasperation. In the photograph above one has taken possession of a haunch of venison hung at the end of the tent.

modations for half a dozen or more persons, and included two large bunks for guides. Since we had come down the river to avoid putting up the tent on wet ground, the Austrian's suggestion irritated me. When I informed Squires of the situation, he flushed with anger, and I saw a gleam in his eyes that showed his deep resentment.

Turning to the Austrian, I said that we would return to the track. Since my guide and I had occupied the tent together during the previous two weeks, I did not wish to accept his limited invitation. In a few minutes we were again in the canoe and reached the track a little before dark.

northern horned larks, pipits, ptarmigans, and a superabundance of Canada jays. The only water birds noticed were herring gulls, two pairs of American mergansers, and a large number of Canada geese. Doubtless I missed other birds on account of my confinement in limited areas when watching for migrating caribou.

This island is too far isolated in the northeast to invite transient visitors on their flights to and from the easterly Canadian provinces, which, aside from barren Labrador, are the nesting grounds of a great variety of wild fowl. Many migrate each fall in a southeasterly direction so as

I might add that when the exclusive scion of the Old World ascended the river the next day he was watched by a local warden, and was caught shooting a large caribou stag within the five-mile protected area north of the track. As a result, his trophy was confiscated and later he was heavily fined, much to the gratification of my guide.

Because of the class distinction so generally prevailing abroad, this happening was, of course, understandable, however much it was out of place in the American wilderness. In other respects I have no doubt this particular individual was a man of attractive parts, and intended no offense by his actions.

SOME NEWFOUNDLAND BIRDS

On my trips to the Island I was disappointed at seeing so few birds in the interior, where conditions seem not to be favorable for the support of many species. I saw a few ravens, thrushes, sparrows, nuthatches,



CANADA JAYS APPRECIATED AN ALL-DAY CAFETERIA

At one of the camps in Newfoundland the whiskey-jacks so persistently hunted food that the author provided a table for their special delectation as shown above. It was well patronized (see text, page 19).

to reach the Atlantic coast at Nova Scotia, or much farther to the southward, where shallow waters and protected bays afford satisfactory fall and winter quarters.

The situation is entirely different about the rugged shores and indentations of Newfoundland, where there are to be found many of the most interesting of the northern sea birds. These nest in the vicinity or may be seen fishing up and down the coast. Among the tidewater birds are auks, murre, puffins, jaegers, gannets, shearwaters, dovebies, fulmers, petrels, and gulls.

On my journeys across the Gulf of St. Lawrence to Newfoundland I saw many sea ducks, including eiders, three varieties of scoters, and a few harlequins. The Labrador duck, like the great Auk, has been extinct for many years, the last specimen having been taken in 1878.

A number of the above sea birds go long distances down the Atlantic coast in mid-winter, where they may be seen fishing several miles from offshore. The large white gannets, for instance, I saw each winter off the eastern coast of Florida where, high

aloft, with half closed wings, they plunged into the turbulent waters after their prey. These gannets are the largest as well as the most northerly species of the Booby family, one of the more southerly of which, called the white-bellied booby, I describe hereafter in an account of a voyage to the Bahama Islands in 1907.

WILD GEESE IN NOVA SCOTIA

In the fall most of the Canada and other geese headed for the eastern seaboard to winter in the Virginia and Carolina waters, stop often en route in bays and ponds along the coast of Massachusetts or that of Long Island, the severity of the winter governing the choice. It will, therefore, be a surprise to many to learn that tens of thousands of geese winter in Nova Scotia waters.

On my several trips through Nova Scotia on my way to Newfoundland I admired the beautiful open country, the farms, lakes, and high ridges in this islandlike province which, although 375 miles long, is attached by a narrow isthmus of 11 miles to the eastern coast of New Brunswick. Its coast line is of a most varied and extraordinary



A DENIZEN OF THE NORTH WOODS SHOWS SCANT FEAR OF MAN

The Canada jay, living in the coniferous forests on the fringe or beyond the limits of civilization, is remarkably tame and bold. Despite an enormous capacity for food, he sometimes gets enough, and then stores his surplus in tree crevices. This reserve supply may enable him to sustain his young in early spring before good foraging is possible.

character, for on the west lies the Bay of Fundy, with an average tide of 45 feet, which surges against 125 miles of cliffs.

There are many deep and safe harbors, and a large number of shallow bays where large beds of eel grass provide an abundant supply of winter food for the geese, this being particularly true of Port Joli, and Port le Herbert, where the shoal waters prevent shipping activities.

FUNDY TIDES OFTEN AID THE GEESE

The tides, when the weather is unusually cold, sweep out the thin ice at intervals and give the geese a chance to get at the eel grass. Experienced hunters estimate the number of geese wintering in Nova Scotia

as between 50,000 and 75,000, although these figures have often been much exceeded by uninformed persons making exaggerated statements.

The presence of so many geese during the winter in these northern waters only proves once more that the migration of birds south each fall is not entirely for the purpose of escaping cold weather, but because such weather destroys and puts beyond reach their customary supply of food.

Along streams in the Rocky Mountains, that are kept open by hot geyser springs or swift currents north to Alaska, may be seen mallard ducks. They are indifferent to the weather so long as they find green vegetation or other food.



CHAPTER II

The Wilderness of New Brunswick

THE Province of New Brunswick is within less than a day's travel from the great metropolitan cities of Boston, Philadelphia, and New York. Whoever leaves these busy marts for New Brunswick is amazed to discover a region so isolated by large forests, hills, valleys, lakes, rivers, and sea. Save in the fastnesses of the Rockies, few places can be found so unchanged by man as the wilder tracts in the northwestern part of the Province.

In July, 1907, I passed an enjoyable time in New Brunswick hunting moose and deer with the camera and flashlight. Although I had traveled through this famous game country a number of times while en route to Newfoundland, my plans on no previous trip had permitted a visit into its wilds.

AFTER MOOSE AND DEER WITH THE CAMERA IN NEW BRUNSWICK

Leaving the railroad at Plaster Rock, in company with Adam Moore, the famous guide, trapper, and philosopher of these woods, I ascended the Tobique River 70 miles to its headwaters, Nictau Lake. Heavy and almost continuous rains during the previous month had kept the banks of the stream full, or as Moore expressed it, at a "logging stage"—a most unusual condition for a midsummer month.

The Upper Tobique is peculiar in that it has no rapids, no falls, and no slack waters, excepting an occasional salmon pool, for some 60 miles; yet it is one of the swiftest streams I have ever attempted to paddle. I say attempted, for the grand rush of the current, combined with the unusually high stage of water, made the bow paddle virtually useless.

All our motive power was concentrated in a ten-foot pole shod with steel, which the giant Moore, standing erect in the stern of the canoe, wielded with an expertness and strength that slowly but surely overcame a current against which paddlers would have been helpless. Except when we made a sudden dash from one bank to the other to avoid stretches of water too deep for the shoving pole, no paddles were used during the three days required to ascend the stream.

Admiring Moore's deftness, I inquired whether he had ever fallen overboard.

"No," he replied, "but then you can never tell when such a thing will happen."

A few minutes afterward the bow of the canoe suddenly lowered and I heard a splash behind. Turning around, I saw Moore coming to the surface, holding his watch high in his hand, an indication of his alertness in a sudden emergency. In the abnormally high waters his pole had failed to reach the bottom, and he had headed into the stream to avoid capsizing the canoe, a catastrophe a novice could not have averted.

When, pausing for luncheon on a forest-bordered beach that showed many tracks of moose and deer, we opened a can of salmon, and I remarked, "Perhaps this very fish once swam the Tobique during the spawning season." Unlike the salmon of the Pacific coast, which die after spawning, those of the Atlantic return year after year to the same streams.

Tossing me the empty can, Moore said, "You will see by the label that you have missed your guess by thousands of miles. This was canned in southeastern Alaska."

Such "bringing coals to Newcastle" is explained by the known scarcity of the eastern salmon as compared with its western relatives.

AN AGED FOREST OF BIRCH

Extending for a mile or so along the left bank of the Tobique at one point was a magnificent forest of white birch, many of the trees about two feet in diameter. I remarked to Moore that I had never before seen a native forest of white birch, having always believed them to be second-growth trees. He replied that the stand we were viewing had sprung up after the great fire of 1825, at which time a large portion of the country was devastated and many hundreds of lives were lost. He added that the trees had passed maturity and were beginning to topple from the onslaught of heavy winds.

Much might be written about the beautiful scenery, the moose and deer crossing the river ahead of us beyond range of the camera, the slow contest with the current, and the attractiveness of the camp each night and the appetizing supper of trout that had enjoyed life in this spring-fed stream until



A FAMOUS GUIDE WAS A DOUBTING THOMAS

During the author's trip to New Brunswick he was fortunate to have Adam Moore as his guide. Moore was widely known for his unusual ability and for the effectiveness of his services. At first skeptical about the photographing program, he became intensely interested in the sport.

the blazing campfire told me it was time to cast a fly into its clear waters.

As we entered the narrow creek connecting Lower and Upper Nictau Lakes, Moore, carefully scanning the stream, remarked, "There were plenty of moose in the water today."

MOORE SEES HAIRS ON THE WATER

Although I had hunted moose for many years, I had not noted any disturbance in the muddy bottom or any tracks upon the bank. I had failed to observe floating here and there upon the current numerous gray-brown hairs shed by the moose as they fed on the aquatic plants in the adjoining lake.

We soon reached Moore's cabin, at the lower end of the lake, in a secluded corner that afforded a view of the entire lake. Here, on a well-cleared bank, with a more or less continuous smudge, we were able to fight the sand flies, black flies, and mosquitoes and yet be in a position to enter the canoe in a moment should a moose appear.

IT RAINED MOOSE

The day following our arrival was dark, warm, and wet; and it fairly rained moose. The animals' utter disregard of dampness was evident, for they waded out into the deeper parts of the lake, into which they would sink entirely out of sight, in their search for the roots of aquatic plants. So dark colored are moose and so swift their movements when they are pursued by a person in a canoe, that I refrained from attempting to photograph them under such unfavorable conditions.

The days that followed were more propitious, although showers fell occasionally. Several times a day we paddled silently along the dark-fringed shores until close enough to a feeding animal to overtake it by rapid paddling after it had finally discovered us.

Like all the deer family, the moose has a poor and indiscriminating eye, and depends for protection upon its keen nose and ears; therefore, frequently when the animal has its head submerged, it is not difficult for a person to approach it in a canoe. In the succeeding five days I obtained a dozen or more photographs by taking advantage of this fact (see pages 28, 30, 32).

When I returned to camp each afternoon, I made preparations for a much more exciting camera hunt when darkness should shroud the little lake. Substituting smaller lenses for the large ones used in daylight work, we would enter the canoe about 9 p. m. with the jacklight in the bow and the flashlight apparatus within easy reach, and paddle along the dark and silent waters, while the single blazing eye of the canoe sought for some nocturnal denizen along the shore or out in the deeper waters of the many bays.

NIGHT ADVENTURES WITH BULL MOOSE

Until his first experience with the jacklight, Adam Moore had considered hunting with the camera merely an interesting but not unusual pastime. For many years he had studied these animals in the waters and in the forest of his native

place. On the first night hunt, when his keen ears detected the wallowing of a moose at the edge of a small bog, and when later he saw its bright, translucent eyes and finally its massive body illuminated by light from the jack, he grew intensely interested (see opposite page). When the flash was fired and the great beast struggled about, blinded but not really alarmed, by what it thought was a flash of lightning, Moore laughed loud and long. Every night thereafter he was first in the canoe.

Hunters have told so many tales of attacks upon human beings by moose that many people believe such happenings actually take place. The real explanation of



A MONARCH PAUSES IN NICTAU LAKE

On quiet summer days pictures like this may often be seen through openings in the bordering forest. The country is dotted with such bodies of water. The moose find good forage in them. The author's guide was adept at finding likely places for camera hunting on this trip.

the supposed belligerency of moose at night became apparent to me on this trip.

One evening, Adam in the stern, his son in the middle, and I behind the light, paddled toward a large bull feeding in the center of the shallow lake. We were only 30 feet away when the head sank out of sight. The canoe could have passed over the large, submerged antlers. When the flash was fired, the moose showed no concern. We kept our position, and I prepared and fired a second flash. This again eliciting no response, I prepared a third charge, but when I pulled the trigger, the cap alone exploded with a sharp crack. In a mighty swirl, the big animal, alarmed at the snapping sound



AN EARLY VISITOR STARTLED THIS LADY

On starting trout fishing one foggy morning, the author found a cow moose taking a bath. The foggy background made a picture possible.



THE AUTHOR CAUGHT A "TIP-UP" NESTING NEAR NICTAU LAKE

This bird is characterized by its solitary habits. It is a species frequently seen in Northern States, its bobbing tail and plaintive notes attracting attention as it feeds or flits along the streams.



A BULL MOOSE GOES FORAGING AT NIGHT

After flashlighting this fellow in deep water the author again snapped it near shore. Unlike deer, moose are not alarmed by the glare and roar of the explosion when they are photographed, apparently regarding these phenomena as natural, like thunder and lightning (see text below).

behind the light, swam rapidly away toward the inlet of the lake.

I recapped the flash, and we paddled in the direction he had gone. We soon saw him standing in about two feet of water close by some bushes and facing the light. Again I fired the flash. Displaying a little concern this time, he began walking up the stream.

While the paddler kept in sight of him, I prepared the fourth flash. Just as the moose entered a broad trout pool, and while he was facing the bushes a few yards ahead, his big antlers only partly visible over his body, I fired the charge. Never before had I been given a chance to photograph the retreating form of a moose at night.

In the smoke-filled atmosphere in front of the jack I heard a great splash and then another. At the same time a deluge of cold water drenched me and the cameras. There within four feet of the jack, his big head towering seven feet above the canoe, stood the bull, looking not down into the light, but beyond, as if preparing for another spring.

It certainly seemed time to do something.

Half rising, I waved my cap before his astonished eyes and gave a yell that could have been heard a mile or so away. This was sufficient. With an easy lope he entered the bushes upon our immediate left and disappeared.

Moore, howling with delight, made some remarks about the penetrating quality of my voice. This, I told him, might be accounted for by my position in the canoe at the time. Since my lively bombardment of a subject of King Edward took place on the night of July 4, it might be considered my contribution to the pyrotechnic celebrations that were occurring the same evening throughout the States.

My adventure confirmed what I had long suspected. The moose perceived the vivid flash only by its reflection on the bushes ahead; hence its sudden retreat. The cow that apparently charged our light in Canada, as the picture shows, was at first facing away from us. The bull that my old hunting companion shot at was standing, stern toward us, gazing at the diffused light of the jack reflected on the bushes beyond, and the sudden rifle shot caused him to swerve



ALL POWER ON

This New Brunswick moose was photographed from a canoe as he surged across Nictau Lake at such a rate that it required the best efforts of two good paddle men to take the camera within range.



A COW AND CALF MOOSE APPROACH SALT LICK

These animals were caught as they walked unsuspectingly before the flashlight camera under the shelter of midnight. The presence of the youngster was not noted until the plate was developed two weeks later (see text, page 39).



A PANIC-STRICKEN BULL MOOSE MADE A HURRIED LANDING

This photograph was taken on Nictau Lake in daylight; at night he would not have fled.



THIS MOOSE WAS CAUGHT BY FLASHLIGHT AND DAYLIGHT

Development of the plate and that shown on page 32, upper, proved that the same subject had been photographed twice.



A YOUNG MOOSE WAS INTERESTED IN THE APPROACHING JACKLIGHT

He appeared unconcerned, probably wondering at the rising of a sun in the middle of the night.

from the apparent source of danger in front and thus to plunge down upon the canoe.

I recalled that in the five or six instances that white-tailed deer had thrown water into the boat when dashing madly by us, they had all been looking into the forest at the wavering light of the jack upon the trees or bushes. When the explosion came, they instinctively rushed into the water away from the terrifying reflected lights and shadows of the forest. On the other hand, in the hundreds of cases in which I fired the flashes directly into the faces of deer, moose, elk, and other wild animals, they never, in a single instance, charged forward after the explosion.

The hunter should avoid firing a flash or discharging a rifle at a moose at close range when it is facing away from him. If he does so, he should be prepared for a possible collision more or less dangerous because of the great weight of the animal. If the hunter cannot swim, he should not risk a

character in the fall. Many articles have been written on this subject, most of them by honest, well-meaning sportsmen of somewhat limited experience, describing their narrow escapes from the sudden charges of these big animals when they are fired upon. The explanation is simple. When a moose is suddenly shot at from behind by an unseen hunter and is not wounded, it almost invariably takes its back track. This frequently brings it face to face with the surprised hunter, who may or may not then succeed in shooting it down.

When a moose is fatally hurt, or very badly wounded, by a shot from an unobserved hunter in front of it, it generally rushes madly forward 25 yards or more in the agony caused by its unexpected injury, and thus, once more, the animal is close upon the hunter with a suddenness that is somewhat terrifying to those who see in its glaring eyes an overpowering desire for revenge. In either case the animal has every



DAY OR NIGHT, HE LOOKED THE SAME

Comparison of this daylight photograph with the flashlight on page 30, lower, reveals how characteristic of the subject was the pose.



A BEDRAGGLED OLD COW MOOSE OFFERS CONTRAST

Her lethargy was probably due to her poor physical condition. Not all of the females of the species were thus spiritless (see lower picture on opposite page).



A MAGNIFICENT BULL GOES INTO ACTION

He did not tarry as the canoe approached, but made for shore at breakneck speed. The greatest spread of New Brunswick moose antlers range between 66 and 69 inches.



FOR ONCE IN HER LIFE SHE WAS ALMOST GOOD LOOKING

Rusty brown, long legged and short necked, with a huge nose and mulelike ears, the cow moose is usually unattractive. This one, however, has assumed an admirable attitude of alertness.



MOOSE ARE LUSTY SWIMMERS

This bull was photographed by daylight as he was making for shore to escape the canoe.



THIS COW MOOSE SHOWED SPIRIT

Unlike the bedraggled specimen shown on page 32, lower picture, she went into action quickly as the canoe approached. Note the hump with bristling hairs on her shoulders and also on the shoulders of the bull above. Both pictures were taken on the same day on a lagoon near Nictau Lake.

is particularly dangerous during the mating season, even if not being hunted. It is true that he is then more indifferent to his safety. When in some remote forest wilderness his feverish eyes mistake the distant skulking figure of a man for his lady love or his rival, he approaches with a bellow. It is easy to understand how some persons may interpret such impetuosity as a desire on the part of the animal to give combat to

his most feared and deadly enemy, man. As a matter of fact, however, just one faint whiff of human scent will send the biggest bull into headlong flight, his massive body quivering with fear.

ANOTHER NIGHT ENCOUNTER WITH A BULL MOOSE

Exactly one year after our experiences flashighting moose in New Brunswick, I received from Adam Moore a letter in which he described a scrimmage he had had with a bull moose when he was using a jacklight. It was his opinion that the animal had become frightened by the fluttering light on the bushes, and had changed its course with no intention of charging down upon the canoe or its terrified occupants.

His letter, dated July 31, 1908, was in part as follows: "We had a change in our Provincial government last spring, and in July Charlie Cremins and I took the new Premier and the Surveyor-General out to see what we were doing. The former

had with him his son and daughter, and the latter his daughter, and they stayed ten days, the same period that you were there last year.

"One quiet, dark night on Nictau Lake, I took out one of the large canoes with Charlie behind the jacklight you gave me, the two young ladies next, side by side, and the Surveyor-General behind them, while I wielded the paddle in the stern. We went



RECONNAISSANCE

Coming out of the dense forest the deer looks carefully about, its reflection showing in the water.



DEER AND MOOSE HAVE DIFFERENT SCHEDULES

The whitetails visited the lick only by day, coming at all hours. The moose, with a single exception, came throughout the night, first appearing at dusk. This indicated the incompatibility between the two animals.



A WHITE-TAIL BUCK APPROACHES SALT LICK

Before 1895 this lick was frequented by many caribou, which were often killed there. With the coming and increase of whitetails and moose, the caribou deserted their once favorite resort and since then have almost vanished from New Brunswick.

out to look for big bulls across the lake from camp. The first seen was a small one, and then came a dandy big bull. We played with him for some time until he took to the middle of the lake. Then we sighted another small bull feeding near shore.

"Passing on to the upper end of the lake, we saw a good-sized bull in the inlet standing near shore in a little cove. Hearing what seemed to be a larger bull beyond, we passed close behind the first animal while it was looking at the bushes, Charlie carelessly keeping the jacklight on it as we passed.

"Seeing only the light and shadows on the bushes, the bull turned in our direction and in two jumps was upon us, jumping over the canoe between the girls and the surveyor, knocking the latter down, and injuring him in one arm and shoulder as it passed over. The boat was nearly filled with mud and water, but I don't think the moose did this. The boat tilted partly over when those in it shifted their positions.

"The boat was taken ashore and emptied, and soon we were on our way back to camp, with the young women so delighted with

their adventure that afterward we went out nearly every night, but we carefully avoided letting the moose see the light on the bushes. I agree with you that when the animal is scared and runs the other way, it doesn't know there is a canoe concealed beneath the little jacklight.

"Of course it was a good joke on the surveyor, for he had charge of the game and fish laws, and to have a bull moose jump over him made a headliner for the daily press. Many think the story was a lie because they don't understand it and we let it go at that, but you and I know how such a thing can happen."

A NEW BRUNSWICK SALT LICK

On leaving Nictau Lake, we descended the river about 17 miles to Red Brook, where we camped a couple of days in a little cabin located about a mile upstream, well up on a steep hillside. This cabin was used by trappers in winter and at other times by hunters or by photographers of game, and near it, a hundred yards below at the base of the hill, was a natural salt lick. Close



SATISFIED THAT HE WAS SAFE, THE BUCK WADED TOWARD THE BLIND

On reaching the stream, the animal drank of the cold, clear water before it gulped down the muddy mixture in the lick. This is the deer shown on page 35, upper picture. He was so confident that both photographs were taken in broad daylight without his being frightened.

by flowed a small creek that emptied into the Tobique a mile down the valley. This salt spring, as usual in this region, issued from beneath a sandstone ridge, resembling those of the Lake Superior region.

A large and comfortable log blind had been built above the edge of the lick, affording concealment for the hunter, as well as protection from the mosquitoes. Originally the lick had been frequented only by caribou, but with the increase of deer and moose in the region, the caribou appeared to lose interest in their old resort.

Seldom have I passed a more interesting time in any kind of blind than I did there, for deer and moose came frequently, some of them even too near to be photographed. Among the white-tailed deer that visited this salt lick were a pair of semi-albino yearlings, the white circles about the eyes and the splotched faces giving them a comical expression. Each day we had many opportunities to observe the difficulty the moose, with their long legs and short necks, had in reaching the surface of the lick to drink without spreading their forelegs.

On the first afternoon of our stay I no-

ticed several hundred large yellow butterflies on the mud about the lick. Shortly afterward a big white-tailed buck, with its antlers in the velvet, entered the lick and started up the butterflies, which arose in such a cloud as almost to conceal the animal's body. I was about to photograph this extraordinary scene when the deer, evidently even more surprised and startled by the butterflies than I had been, made a long leap and disappeared among the bushes. In northern Michigan a dark blue species of butterfly was often observed at salt springs.

I thought it quite possible that flashlight pictures could be taken at night from an opening in the blind, and that we might thus profitably occupy our time during the early evening hours. I therefore arranged a camera so that it would cover the main part of the lick and fastened the flashlight apparatus to the outside of the blind where it could be fired by pulling a string.

After a late supper we went down to the blind, hoping for success. Soon after dark we heard a heavy animal coming down the hillside. After it had passed, we could hear it gulping down the muddy waters.



A PAIR OF YOUNG WHITE-TAIL DEER COME DOWN TO SALT LICK

They show distinct traces of albinism, the one to the right particularly, its white markings giving it a comical masklike appearance. This photograph was taken in a heavy rain on a dark day.

Turning on the electric hand flash, I saw a moose standing too close for a picture. I waited until it had moved farther out, and then fired the flashlight. Soon afterward, we heard another animal walking along the creek and, judging from the sound that it was in front of the camera, I fired the flash again.

Up to this time on the trip I had not obtained a picture of a moose calf and had about given up hope of getting one. When I developed the negative of this second flash, some two weeks later, I was greatly pleased to find on the plate the photograph of a cow moose with a little calf trudging along behind (see page 29).

The next morning a young white-tailed buck lay down in the grass opposite the blind and gave me one of my few opportunities of witnessing a deer chewing its cud. At noon we left the blind and the cameras and went up the hill for luncheon. While we were seated at the door of the cabin I remarked to Moore that some animal was coming up the trail.

Looking over my shoulder he exclaimed, "Why, that is a caribou! The first I have seen in several years."

As the animal ambled by a few yards away, we suffered the disappointment so often experienced when one leaves one's gun or camera out of reach.

PHOTOGRAPHING A FAMOUS GUIDE

That night it rained so hard that the creek overflowed the salt lick, so diluting its waters that no animal was likely to come to it for several days. The following morning, therefore, we packed our outfit down the creek to the river. Floating down the swift and swirling waters, we came soon to a more open country occupied largely by small farms. One plate had been left in reserve in case an animal might be unexpectedly seen, an event which I hoped would not happen, for I wished to take a photograph of my famous guide. This I did as Moore was standing at the foot of a small cascade (see page 24).

A mile farther on we noticed a picnic party peering through the bushes at something on the other side of the stream. The object of interest proved to be an old cow moose nibbling unconcernedly on the brush. I did not regret, however, having pictured

the giant form of the guide instead of a vagrant animal that should have known better than to be consorting with a holiday party of humans instead of remaining within the family circle farther up the river amid the forests and beautiful lakes of the northern wilderness.

When I parted from Moore on the lower Tobique, he said: "In my varied experience and with many scenes before me, I can only say in all sincerity that the hunt of the last week has proved more interesting, more exciting, and of more real value in the study of animal life than any that has gone before."

Thus spoke a man who has looked at game over a rifle barrel for more than forty years!

INCREASE OF MOOSE IN NEW BRUNSWICK DUE TO WISE GAME LAWS

Prior to 1885, moose were extremely scarce in New Brunswick, but, as a result of the gradual disappearance of the Indian trapper and hide hunter and the passage of an effective buck law, this noble animal was at the time of my visit more widely distributed and more abundant in parts of this Province than in any other area of equal size on the American continent, except on the Kenai Peninsula, Alaska. Since no cows or calves can be legally killed, thousands of females then formed great breeding herds capable of supplying more than the number of bulls killed annually and of adding many more each year to the permanent breeding stock. In more recent years I fear these conditions have changed and moose are less numerous.

With the increase in the number of the moose came also an increase in the white-tailed deer, and they likewise are abundant. Their availability saved many a big moose or caribou that otherwise would have been sacrificed to meet the temporary needs of the pot-hunter or trapper. Formerly the caribou were also plentiful locally in New Brunswick as in Maine, but from both these areas they now have nearly or quite disappeared. In practical game management, where the producing animals are carefully protected and the increment is made the basis of a restricted killing, we find here a splendid example of good judgment and concurrent rewards.



Photograph by A. A. Allen

CANVASBACKS ONCE ABOUNDED NEAR CORNELL UNIVERSITY

Every fall and winter ducks of this species, scaups, and golden-eyes frequent Cayuga Lake. It was near here that a dangerous crossing on the ice one night was made by the author.



THEY ARE WINTER RESIDENTS OF LONG ISLAND SOUND

This group includes two nearly adult ring-billed gulls with an adult in the center. The ring-bills are generally distributed with the herring gull, which they resemble in color, but they may be distinguished by their smaller size. On the coast their habits are like those of the herring gull, but in the interior they sometimes feed on insects as well as fish.

CHAPTER III

At Cayuga Lake, on Long Island Sound, and Sandusky Bay

UNTIL the fall of 1877, when I went to Cornell University, at Ithaca, on the south shore of Cayuga Lake, I had never done much duck shooting. I had, however, hunted small game, including grouse and the wild pigeon, and had shot many deer in northern Michigan, where I had gone year after year since 1870. The south shore of Lake Superior affords very poor duck hunting, for most of the migratory wild fowl seem to avoid crossing this wide, deep, cold body of water, and pass either through Minnesota or to the east, along the St. Clair flats and Lake Erie.

In talking with some local hunters at Ithaca, I learned that the duck shooting there was rather satisfactory, marsh-frequenting species being found at both ends of the lake, and the redhead, canvas-back, broadbill, and golden-eye on the open water.

Aside from a few incidents, it is not my purpose to give an account of my many pleasant days on Cayuga Lake, except to say that if I had devoted the same amount of attention to my studies I might have received a *cum laude* degree from the university.

Once, when Cayuga Lake was frozen over at the south end, I planned to join a few companions to shoot ducks along the edge of the ice. It was agreed that, on the night preceding the hunt, I was to walk some distance down the railroad track on the eastern shore, and then cross the lake on the ice to a cottage on the opposite side, where a lighted lantern would guide my course. On reaching the proper point, I could see the lantern about two miles away and began my journey on the ice.

The night was dark, and I could not even see the hills against the sky. When I had gone about halfway across, a great flapping of wings and a loud quacking of ducks startled me. Less than ten yards in front of me was open water. Had not this open water contained some black ducks, I should have plunged in and, loaded down with ammunition, gone to the bottom.

How far this open water extended and where I could get around it, there was no means of determining. With palpitating heart I began to retreat; but this was not



HE STOOD NEAR THE BLIND AT
SANDUSKY BAY

This greater yellowlegs was the first shore bird the author bagged with the camera.

easy, for there was no lantern to guide me. When I had nearly reached the shore a light snow began falling, and this changed the whole situation. Dark as was the night, the light snow showed plainly on the ice, and I was able to complete the trip across the lake without further trouble.

Next day I refused, despite tempting chances, to shoot at any black ducks, for among those that passed there might be, I thought, some of those that had warned me the night before.

STILL-HUNTING THE GOLDEN-EYE

It was on Cayuga Lake that I first witnessed a still hunt for diving ducks. In Ithaca I had often seen an old trapper peddling a basketful of dressed ducks whose plumpness would appeal to most housewives. They were golden-eyes, which, when deprived of their feathers, resembled closely some of the more edible species.



HE SEIZED A BLOODLESS VICTIM

By a fortunate chance the camera in the author's blind, near Sandusky Bay, was trained on his wooden decoys in expectation that some passing duck might make a call. When a duck hawk darted in and seized one of the smaller decoys in his talons, a quick shot with the lens recorded this scene.

Since these birds are wary, feed alone, and seldom fall victim to the fowler, I asked the vender how he obtained so many every week. He said that on any day that the weather was moderate he rowed along the shore of the lake, looking carefully around each bend for golden-eyes feeding on crayfish in gravelly bays, where they were usually within gunshot of the shore. When he saw one he would land and, as the duck dived, run about 50 yards toward it, sinking to his knees when it was about to appear. As the duck came to the surface, he would kill it on the water or as it was taking wing. I went with him one day and saw him kill

half a dozen birds. They were fine-looking when dressed, and he did a thriving business.

When broadbills were numerous this market hunter would toll them within close range of his blind by having his spaniel run up and down the shore as an enticement. He told me that on several occasions he had fired both barrels into the closely packed flock and killed about 25 birds with a shot. The Federal Migratory Bird Law has stopped this form of market hunting.

TWO YEARS ON LONG ISLAND SOUND

From Ithaca, where Cayuga Lake had proved such an attraction, I went to the Yale Law School in 1881, intending to devote a little more attention to my studies than heretofore. The proximity, however, of Long Island Sound renewed my interest in duck shooting, and I passed many weekends at the mouth of the East Haven River,

where I was allotted a room as the only winter guest in a summer boarding house, and soon acquired a great liking for Mr. and Mrs. Dennis Mansfield, its owners.

About that time I purchased a "Barnegat sneak-boat," one of the most seaworthy types of small, rough-water boats ever constructed. It was only about ten feet long and three wide, but apparently no gale could sink it. Built of Spanish cedar, it had a sharp bow edged with brass, which curved into a rounded bottom extending nearly to the square stern. Because of its construction, the bow cut the waves and the body of the boat was lifted up, riding the water



THIS GREATER YELLOWLEGS WAS SOCIABLE

One day he came in and alighted in the shallow water by some duck decoys near the shore of Sandusky Bay, where the author was awaiting the arrival of ducks.



BLUEBILL OR LESSER SCAUP DUCKS ARE COMMON IN THE EAST

In the fall and winter this duck is widely distributed in open waters from Long Island Sound to Florida and the Gulf coast. This photograph shows two drakes with black heads, light backs, and white sides, and four females in somber grayish brown plumage except for a white band back of the bill. The broad, blue bills of these birds account for their common name bluebills, or broadbills.



SHE WAS FIRST OF HER KIND TO POSE

On Sandusky Bay the author began wild duck photography with this female mallard and the drake shown in the picture on the right.

like a duck. It had a cockpit with a four-inch railing, and in all my experiences in the winter weather on Long Island Sound, and later on Lake Superior, it was never necessary to bail it out. It carried a leg-of-mutton sail for use when needed, and had a metal centerboard, so that long trips could be made with speed and comfort.

HOW THE AUTHOR'S BOAT GOT ITS NAME "CERTAIN DEATH"

Mansfield, who had a large number of flat-bottom rowboats for the use of his summer boarders, eyed my craft with great suspicion and called it *Certain Death*, which name it still bears on its bow in my camp garden at Whitefish Lake, Michigan, where, filled with flowering plants, the mast entwined with vines, it has left the water forever, but serves as a pleasant reminder of 50 years ago.

The form of duck hunting on the Sound that interested me most was line shooting. This was done from a line of boats anchored off a point dividing two good-sized bays. The boats were placed about 90 yards apart, and sometimes extended out into the

Sound half a mile, the length of the line depending, of course, on the number of shooters.

The boats, when anchored, headed up into the wind, while the shooter, reclining in the cockpit, faced down wind, from which direction the birds almost invariably came. Wild fowl coming out of either bay or following an offshore course, would not notice these boats, with their subdued colors, until they were within about 150 yards, when they would rise a little higher and pass midway between two of them. This gave each sportsman therein a shot at not more than 45 yards.

WOE TO THE DUCKS THAT BREAK THROUGH THE LINE

When a number of ducks broke through different places in this line, there was a great bombardment, the spent shot often rattling about the nearest boats. To recover the dead or wounded ducks, the fowler had only to unsnap a line running to the anchored buoy. If uncertainty prevailed as to which hunter killed the duck, the best oarsman settled the question.

Though this form of shooting was exciting when many birds were on the wing, the culinary value of the game was of a low order, since most of the victims were old squaws, white-winged coots, and loons, with now and then a broadbill or some other deep-water duck. When line shooting was not possible, I would row out to some large exposed boulders known as the "Cow and Calf," where I would place decoys according to the prevailing wind and pull up the sneak-boat on the opposite side.

One bright, still day that held little prospect of any shooting, I heard a "ping" to the right, and then the crack of a rifle on shore. The would-be duck hunter had a high-power repeater, and I thought his efforts amusing until one of the bullets was deflected from a wooden decoy and fell at my feet. While he was reloading, I stood up, waved my hat, and fired off both barrels of my shotgun. The long-range hunter hurried back into a patch of woods.

sundown, when I thought the wind might in a violent offshore gale. I waited until sundown, when I thought the wind might subside, but instead it seemed to grow more violent. Had the boat been less heavily loaded, it would have been possible to row quarteringly toward the shore, but since

most of the decoys I had out were fastened on a collapsible frame, it was impossible to reach shore with such a load.

I started down the Sound with the wind off my quarter, hoping to make a landing farther along. I managed to get ashore at Thimble Islands, some ten miles distant, and in a buckboard drove back to the East Haven River. It was then about midnight, and I saw a light in the barn, where Mansfield was hitching up his horse to carry the news to my friends that I had been drowned in *Certain Death*, as he had always predicted.

A PREDICTION THAT CAME TO NAUGHT
CAUSED DISAPPOINTMENT

At my unexpected return he seemed quite disappointed, appearing, for a moment, to value his predictions above the loss of a friend for whom he had mourned half the night to no purpose.

On October 16, 1901, I went from Pittsburgh to the Winnow Point Club, Sandusky Bay, on Lake Erie, to make one of my first efforts in photographing ducks. I was accompanied by an artist-sportsman who wished to make sketches of marsh scenes for some of his water-color pictures. Since the shooting season did not open for several weeks, we could occupy any pond or blind that the weather permitted. Although I was using a long-focus lens, the shutter was not rapid enough for taking wing pictures of ducks, and I had to content myself with photographing swimming birds, some in groups, and others singly and close to the blind.

Conditions at Sandusky Bay have long been favorable for wild fowl, and practically every species of duck frequenting the waters east of the Mississippi River resorts there, the black duck, mallard, and the two kinds of teal predominating. Here also during migration may be found occasional flocks of wild geese and large numbers of whistling swans.

At the time of our visit an extraordinary condition prevailed in these great marshes, which, for more than 50 years, had been the favorite hunting resort of many sportsmen from Cleveland and other cities of the region. Formerly most of the shallow bays there had produced a large variety of duck-food plants in such abundance that birds had been drawn to the feast from far and near. Then some misguided person introduced German carp into these waters. As



THE DRAKE FLOATED NEAR THE DUCK

He and his consort on the left obligingly "posed" near the blind on Sandusky Bay for the author to make his first pictures of waterfowl.

they increased rapidly in numbers, these fish, with their hoglike feeding habits, had almost completely destroyed the plant growth.

So thorough was this destruction by the time of our visit, that all wild-fowl shooting would have ended for lack of birds except that the shooting clubs had resorted to the costly expedient of baiting the shallow waters with grain. So far as I am aware, this was one of the first instances of this practice that has now become so general.

SANDUSKY BAY CARP WROUGHT HAVOC
IN MANY WAYS

So destructive and pernicious were the carp that during periods of high water they ate the bark from the willows along the bank to such an extent that the trees were girdled and killed. They ate the spawn of any other fish breeding there, and kept the waters so continuously roiled that the formerly abundant bass were driven out into the clear water of Lake Erie.

On the second day of my visit to the Sandusky marshes, I saw a duck hawk flying toward me a short distance in from the shore,

where it was ready to seize any duck that should flush from the shallow waters. Hoping that the hawk might pass over the teal decoys I had out, at a speed slow enough to be pictured, I awaited its coming.

On seeing the decoys, the hawk swung out over the water, and as it passed over the first decoys I prepared to take a snapshot, but the hawk suddenly dropped on one of them and submerged it by the force of the attack. As the hawk attempted to rise with the decoy in its talons, I obtained a picture of the unusual scene (see page 42).

The captor struggled aloft with its prize, the long cord and lead anchor trailing behind. When the hawk was halfway across the pond, the decoy slipped from its grasp and plunged beneath the surface for a moment after striking the water. The hawk then flew to a near-by muskrat house, on which it sat, evidently trying to figure out what had happened, for there on the water floated its desired victim showing no evidence of harm nor of alarm.

After a few minutes the bird of prey went its way and I rowed out and recovered the kidnaped dummy. On its back were deep scratches, and the sides and bottom showed punctures like those made by small shot.

Two days later I was occupying a blind on a larger body of water, and this time the decoys were divided into two sets, with an opening between for any visiting duck. I had been in the blind for only a short time when I observed a large bald-head eagle flying low over the water, and wondered

whether it, too, would make a visit to my decoys. The eagle alighted on a snag about one hundred yards away, and watching it through the glass I could see that it was intently eyeing the decoys. I swung the camera to the left to be ready when the bird should pass over the first set.

Just as I had done this, the eagle drew near, but instead of dropping down on one of the first group of decoys, it continued on to my right, and seized from the second group a decoy representing a drake mallard. I hurriedly swung the camera in that direction, but the motion was observed by the eagle, which dropped its prey and hastened away.

The bird may have passed the first decoys expecting that they would spring into the air in alarmed flight, and that it could easily capture one, as frequently happens in such cases; but when they did not flush, it tried to make certain of a capture among those beyond. Hawks and eagles every now and then appear to be completely deceived by the painted wooden decoys, and commonly they pay the extreme penalty exacted by the irate hunter for a capital crime committed against his property.

On one occasion a friend of mine was looking away from duck decoys set before his blind on Henry Lake, Idaho, when he heard a splash and, turning quickly, saw a bald eagle carrying away the wooden image of a canvasback. A quick shot brought down the marauder, killed instantly, the decoy still held firmly in its talons; a rather ignominious end for such a royal bird.



GREEN-WINGED TEAL ARE GRACEFUL SWIMMERS

These handsome little ducks were rather numerous in marshy ponds near Sandusky Bay.

CHAPTER IV

Birds of the Nation's Capital

SINCE 1926 I have passed each spring, fall, and the early winter at my suburban home in Wesley Heights, Washington, D. C. The rolling hills and the valleys in this area are largely covered with forests, so that the clearings about residences, where scattered trees remain, and shrubs and other vegetation have been planted, provide favorable places for birds. The feeding boxes, the bird bath, and the top of a rounded slope beneath my library windows daily attract feathered visitors.

Although we are surrounded by other residences, the birds that come vary in size from humming birds to crows, and include the sharp-shinned hawk, the Carolina dove, and the wood thrush.

LIST INCLUDES 42 SPECIES

During the 10 years of my stay there I have kept a careful record of the birds observed on the premises. The list of species is being gradually increased each season, but lacks the several small flycatchers, vireos, and warblers that undoubtedly visit the plum tree near by during every migration. Their movements are too elusive to permit me more than a glimpse of tiny flitting forms. At the time of this writing, in the spring of 1935, my list contains the following species:

1. Bob-white; 2. mourning dove; 3. sharp-shinned hawk; 4. sparrow hawk; 5. hairy woodpecker; 6. downy woodpecker; 7. red-bellied woodpecker; 8. flicker; 9. chimney swift; 10. ruby-throated humming bird; 11. great-crested flycatcher; 12. blue jay; 13. fish crow; 14. starling; 15. cowbird; 16. purple grackle; 17. goldfinch; 18. white-crowned sparrow; 19. white-throated sparrow; 20. chipping sparrow; 21. slate-colored junco; 22. song sparrow; 23. English sparrow; 24. towhee; 25. cardinal; 26. scarlet tanager; 27. loggerhead shrike; 28. yellow warbler; 29. yellow-rumped warbler; 30. mocking bird; 31. catbird; 32. brown thrasher; 33. Carolina wren; 34. house wren; 35. winter wren; 36. white-bellied nuthatch; 37. tufted titmouse; 38. Carolina chickadee; 39. wood thrush; 40. gray-checked thrush; 41. robin; 42. bluebird.

This seems to represent a fairly good cross section of the bird fauna of this dis-

trict when one considers that it includes only the visitors to a lot 100 by 150 feet in area, located among other occupied lots in the midst of a closely built suburb. The main attractions to our feathered friends are the pool and the bird bath, combined with bread crumbs and seeds scattered on the ground or on an elevated platform, and suet placed beyond the reach of cats and dogs on a slender ten-foot pole, or on the window ledge.

The vicinity of Washington appears to be favored by birds, especially in places where they are provided with suitable cover, food, and protection. A careful census of the breeding birds taken one season at Wild Acres, the partly wooded five-acre tract where Dr. Gilbert Grosvenor has his suburban home, a few miles from town, totaled 135 pairs belonging to 40 species. It is believed that this record has not been excelled on any similar area anywhere in the country.

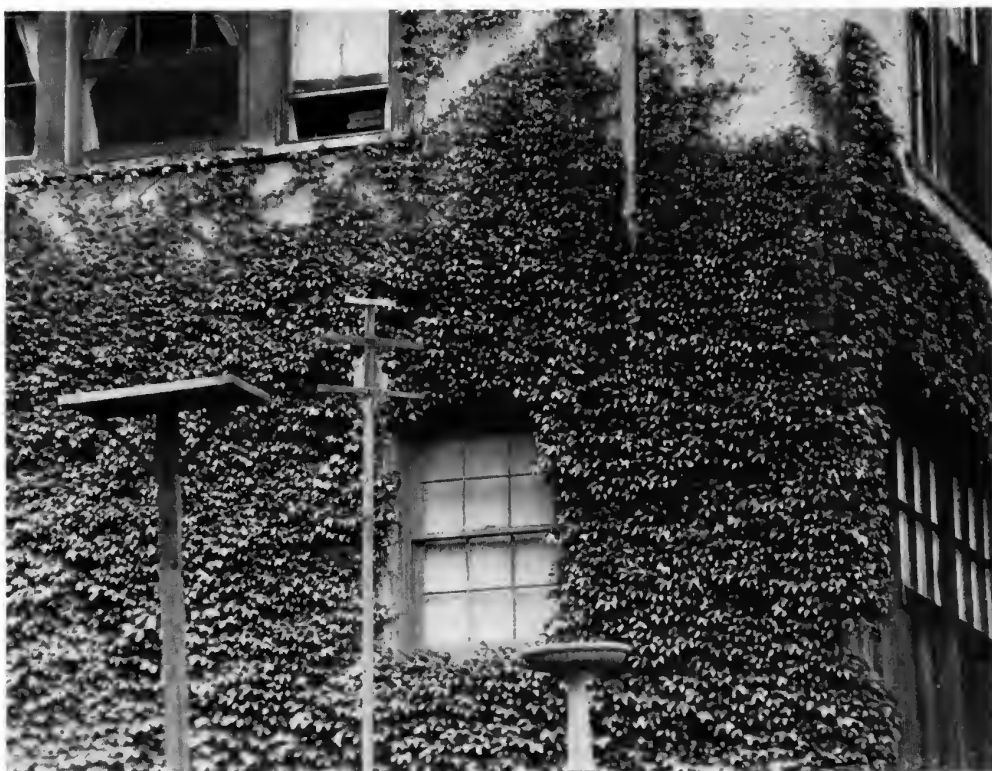
Our success in attracting birds to our home in Wesley Heights has been a source of constant interest and pleasure, for it has afforded an insight into their seasonal changes and their relations to one another that we could not have obtained otherwise.

CARDINALS

Our handsomest and most notable visitors are perhaps the cardinals. At first, only an individual or two appeared, but their numbers later increased. One winter especially, from 20 to 25 cardinals at a time came repeatedly, making a gorgeous display of color on the ground and in the leafless plum tree. Among these was a partly albinistic male, whose lovely shade of a very pale pink made it conspicuous among its fellows.

In contrast to this winter's abundance, another season was marked by the almost complete absence of cardinals, only one or two coming at considerable intervals, despite the varied repast that always awaited them. It was difficult to account for the rarity of the birds unless it was because the winter was an open one, and perhaps an abundance of their natural food supply was available.

The gentle manners of the cardinals are restricted to mated birds. At my winter



THE AUTHOR HAS A BIRD STUDIO AT WESLEY HEIGHTS, WASHINGTON, D. C.

From the living-room windows above, the many visiting birds can be studied and photographed at the feeding platform, the suet pole, and the bird bath. From the basement window such visitors can be pictured on the ground at close range (see, also, page 60).

home in Florida the males become very solicitous in their springtime attentions to their mates. The females commonly stand among the scattered bread crumbs, seeds, and other food, apparently as helpless as young birds, while the males hop about, select the best tidbits, and pass them to the bills of their mates, which complacently accept these devotions.

At Wesley Heights the same scenes of domestic felicity are observed among the cardinals six weeks later. This trait of the male paying such devoted attentions to the female early in the mating season is rare among birds, which usually express their emotions in such instances by singing or by other personal display. Except during the mating and nesting period, the cardinals visit the feeding places individually, and give no sign of any attachment that persists beyond the nesting season.

It was not until the grain was placed on an elevated platform in the winter instead of on the ground that I learned the disposi-

tion of the male cardinal to exclude any of its kind from the tray. This I noticed in January, 1933, when, for a second winter, we had an unusually large number of these handsome visitors. It seems strange that this pugnacious intolerance should be directed largely toward its kin, for often a dozen English sparrows, or a smaller group of starlings would jostle the lone cardinal without any signs of resentment on its part.

It was an interesting but mournful sight to see a dozen or more hungry cardinals, that had come separately from various directions, perched on the leafless limbs of the plum tree waiting their turn for the winter dole, their sharp and impatient *tsip, tsip, tsip*, in marked contrast to the charming duets of the mated pairs in the spring. To correct this situation, I scattered grain about on the ground, so that all might have an equal chance and avoid the provoking delay caused by the leisurely manner of the one in possession when satisfying its hunger.

This seasonal and contrasting mood of

the cardinal is a characteristic of most other non-gregarious land birds, such as the jay, mocking bird, catbird, and brown thrasher, which usually like to monopolize the feeding tray, after the sexes have separated for the greater part of the year. Each leads an individualistic life.

Cardinals are much later feeders than most other birds, often lingering until falling night renders them almost invisible. In contrast to this habit is the behavior of such gregarious visitors as the starling and English sparrow, which leave their feeding places while it is still broad daylight to seek some common roosting place with others of their kind, and often, as a consequence, become nuisances.

ENGLISH SPARROWS AND STARLINGS ARE NUMEROUS

The English sparrow appears to be the street urchin of the bird kind. Although it seems confident and unafraid about the streets, yet at the feeding place at Wesley Heights it is the most timorous of all the bird visitors. These immigrants have never been molested during the years they have had a bountiful supply of food provided for them there, but if a person approaches the closed window to look at them, they almost always whirr up into the top of a small neighboring tree as if expecting harm.

Many times when they are feeding they burst away in full flight in what appears to be causeless frights, but which must be due to some noise or slight movement their acute senses have detected. For many years every one's hand was raised against them, and this may have developed their attitude of supercaution.

Since the replacement of the horse and stable by the automobile and garage these sparrows have lessened in number and appear to have become more insectivorous. In the more northern States, because of scarcity of food in winter, except where friendly persons aid them, the majority of them die of starvation and cold. With their American ancestry dating from about 1850, more toleration should be shown these bustling, cheerful little birds which enliven our towns and villages.

At Wesley Heights I first became acquainted with the starling, a bird introduced into this country about 1890 near New York City by some well-meaning but misguided persons. It has thrived marvelously



A FEMALE STARLING FEEDS ITS YOUNG

These birds, introduced near New York City a comparatively few years ago, have spread over the eastern United States to beyond the Mississippi River. They are useful insect-eaters, but aggressively oust natives, such as bluebirds and others, from their nesting places. In Washington they have defied all manner of efforts to dislodge them from public buildings.



A PURPLE GRACKLE VISITS THE CAPITAL

To the author's suburban home at Wesley Heights in Washington come birds of many colors, sizes, and habits. The District of Columbia has a greater variety of land birds than almost any other area of similar size in the country.



ENGLISH SPARROWS ENJOY A FEAST AT WESLEY HEIGHTS

Presumably tame and fearless, these urban inhabitants have proved the most wary of visitors to the feeding trays provided by the author.

in its new home and has extended its range until it now occurs in all the States east of the Mississippi River and even in Texas and some other States.

Its only virtue is its destruction of a great variety of insects. Aside from this, the habits of this immigrant are pernicious, for it nests in holes in buildings, walls, or trees, and is ruthless in its destruction of the nests and eggs of the bluebird, house wren, and other native birds, of whose despoiled premises it takes possession. In view of the decrease of nesting sites in a thickly populated area, the general spread of the starling may seriously affect the future of the bluebird and other species.

From two to three dozen starlings and an even larger number of English sparrows come much of the time to our feeding places. These two immigrants are so energetic and businesslike in their methods that they consume more food than all the native bird visitors combined.

It was not until late in the spring of 1930 that I realized how greatly the starlings preferred insects to the bread crumbs, grain, and suet provided at our feeding station, to which, during the winter months,

they appeared to be so attached. At that season they were daily visitors, sometimes a dozen of them being present at a time.

Early in May they were often accompanied by their young, which stood or perched helplessly about while the parents picked up the food and placed it in their open mouths. The increased numbers of starlings at that time left little food for other birds and I came to look upon them as pests.

A CHANGE IN DIET

During the latter part of each May a marked change took place. In an entire week scarcely a starling approached the regular feeding place formerly so popular. Several of the birds were seen, however, industriously searching among the short grass of the lawn and in our flower garden, and others similarly engaged were noted on the lawns of our neighbors. They were obviously hunting for insects, for they rooted about in the loose topsoil with the points of their bills. Evidently they met with such success that they became completely indifferent to the food we provided.

These birds' persistent search for insects



HUNGER BRINGS UNUSUAL NEIGHBORS TOGETHER

While a family of starlings is feeding from the top of the piece of suet, a downy woodpecker is going up to sample it from below.

indicates their value in helping keep down the numbers of such pests, a fact that should be considered carefully by communities seeking the wholesale destruction of starlings on account of annoyance they may give in other ways.

THE CHICKADEE COMES UNAFRAID

From the near-by woods came many Carolina chickadees, their nervous movements in nowise indicative of fear. These little black-capped visitors, as expected, were very fond of suet, but we were amazed at the avidity with which they ate sunflower seeds, often carrying these large seeds away to their forest retreat, probably for winter storage.

When climbing up and down, or hanging suspended from beneath a limb searching in the bark for the eggs and larvae of insects, these cheerful little acrobats give animation to the woodland lots. Like their less diminutive associates, the nuthatch, they are in continuous action throughout the day, and it is hard to imagine them quiescent during the long hours of the night.

The chickadees belong to the numerous titmouse family, building their nests in

holes of dead trees, and seldom straying away from their place of birth except in the more northerly ranges when severe weather may force a slow retreat. The habitat of the Carolina species lies between the latitude of Indiana and the Gulf coast, whereas the Hudsonian chickadee inhabits the Canadian provinces northward to the tree limits.

Observing the daily life of my feathered visitors as they gathered about the feeding box or on the ground below has afforded me much interest.

Early in the morning, before the people of the community had begun their daily activities, crows would drop in to skirmish for whatever they might find. Sometimes only a single one would appear, but often there would be several in the group. These feathered outlaws were averse to taking undue chances in their contacts with man and usually departed before the regular boarders came to their breakfast.

For several mornings early in the winter the crows departed as usual, but none of the smaller boarders appeared. This was quite a mystery until a female sharp-shinned hawk was seen perched in the



AN ALBINO CARDINAL IS A SURPRISE VISITOR

Whenever food is scarce, these birds come to the author's feeding places. Sometimes there are only one or two, but once 25 gathered, each coming alone. One season a partly white male, a very pale pink in color, haunted the premises. It is shown here in company with a normally colored specimen.



BLUE JAYS ENJOY THE AUTHOR'S OFFERINGS

Blue jays are among our regular visitors at Wesley Heights. The rough log feeding block shown here is on the sunny side of the house, and often, when the sun is hot, one of them, having satisfied his appetite, will sprawl there with spread wings for a sun bath.

middle of the top of the wild plum tree near the usual feeding place. There it sat motionless as a small image among the bare branches. Evidently the hawk had noted the gathering place for small birds and had selected the partly concealed perch as a convenient place from which to drop on its prey.

One morning a junco flew across the deserted lawn to a low branch of the plum tree. Almost at the instant it alighted there was a flash of brown and it was seized and carried off in the talons of its enemy, leaving some floating feathers to mark the way. When the hawk had flown up and alighted in a tall blue-gum tree near by, it was evident that in some way its victim had escaped. A closer examination of the hawk on its perch in the plum tree revealed that one of its legs hung helpless as if broken.

Before the arrival of the hawk and its attack on the junco half a dozen juncos were daily visitors to the feeding place, but for five days after the attack not one appeared. Apparently the fellows of the injured bird had been informed in some way of the lurking danger.

From time to time after its first appearance in the plum tree, the hawk returned. Its presence seemed to be known to the birds of the neighborhood, and none would appear. As soon as it departed, blue jays and starlings would come to the feeding place; thus it seemed that these



WHAT A PLEASANT PLACE!

The blue jay contemplates the good things on the author's feeding block at Wesley Heights. The bright colors and confident ways of these birds render them very attractive.



IN A MIXED PARTY, RACE AND AGE ARE DISREGARDED

A dove, a young starling, and several English sparrows, the latter the street urchins of the bird family, bold but always alert, dine together at Wesley Heights.

larger and bolder birds actually kept watch of the hawk's movements from points of concealment.

I have commented elsewhere on the general understanding by different species of birds and mammals of the meaning of cries of fear uttered by one of them. The whistling snort of a deer at the edge of the water may send marsh ducks scuttling away, and the croaking of a heron, frightened from its station, appears to be understood by



A GRAY SQUIRREL BECOMES NEIGHBORLY

For several seasons these little fellows from trees near by have been regular and interesting visitors to the feeding places at the author's home.

many animals. Wild creatures are so constantly exposed to deadly peril that those that do not develop an alert consciousness of the meaning of all occurrences about them are promptly eliminated.

Most of the boarders enjoyed a varied diet, but the catbirds, bluebirds, and woodpeckers partook only of the suet, just as the cardinals and doves ignored everything but grain.

There can be little doubt that the dependable supply of food and water induced many of the birds to go to housekeeping on the limited premises. In one week late in May I saw the occupied nests of the blue jay, catbird, chipping sparrow, brown thrasher, and dove. Bluebirds were seasonal tenants of the little box put up for their use.

Thus the yearly cycle in avian life ends, and then begins anew with the younger generation ready to fill in the ranks broken by casualties resulting from accidents or from old age.

Sometimes we were entertained by visitors other than the birds that came to us. Two species of land turtles, one a specially handsome box turtle, often strolled in from

the adjacent woods to wander deliberately about among the flower beds and sunshiny openings. Once a larger turtle was found in the pool of the water garden successfully hunting tadpoles and vainly trying to capture the goldfish. Large green frogs sat on lily pads in the pool, feeding on transient insects by day and performing solos and duets in basso as on twanging banjos by night.

GRAY SQUIRRELS DEPARTED WHEN THEIR TREE FELL

For three years a family of gray squirrels boarded at the bird cafeteria under the windows. Then, suddenly, they disappeared and were not seen again for several years. In trying to ascertain the cause of the cessation of their visits, I learned that a large gum tree that had recently blown down in a neighbor's yard had contained a cavity in which the squirrels had lived and in which they had always been able to seek safety from raiding dogs and small boys armed with sling shots.

The disappearance of these squirrels indicated the necessity for providing shelter

if these animals are to be encouraged in such localities. Nothing but the loss of their safe home would have caused them to leave a place in which the most capricious appetite could be so easily gratified.

PROWLING CATS

Objectionable four-footed visitors were the house cats of the neighborhood. They soon learned that our premises afforded a good hunting ground, and one or another of them came every day to the consternation of the more welcome guests. The cats found good shelter in a row of Japanese barberries at the foot of the slope, but because of the steep slope above on which the birds gathered these were not well located for successful raids.

The victims of the cats were chiefly young English sparrows and starlings, which frequented the slope as a kind of nursery. The young wandered about with open mouths and fluttering wings begging their parents for food and so became easy victims. I have always considered stray house cats and crows as the most destructive enemies of the nests and young of our birds.

In northern Michigan wandering and homeless cats cannot survive the combination of deep snow and severe cold, but in the south, especially in Florida, many of these animals, abandoned by their owners or voluntarily strayed from their homes, have taken to the wilds, where they find plenty to live upon throughout the year.



A CATBIRD ENJOYS A FEAST AT THE AUTHOR'S WINDOW

If, on arriving in the spring, one of these or a bluebird immediately finds and begins eating the suet, it is known for a visitor of the previous year.



A SONG SPARROW PAYS A CALL

It pauses for a bit of suet at the author's window in Wesley Heights, where also several of its cousins find refreshment.

All the hunting skill of their wild ancestors being revived, these cats are a serious menace to most land birds living within their haunts.

Whether in the forest or in open country at night, even when aided by a full moon or a powerful jacklight, one rarely sees birds of diurnal habits. It is difficult to discover where they roost when darkness falls. In more than half a century of observations while canoeing along the shores of lakes and streams, I have seen few land birds at night.



THE RED-BELLIED WOODPECKER IS A RARE VISITOR

Only occasionally does one of these birds come to the author's window ledge for a taste of the food offered there.



AN IMPROVED METHOD IN WINDOW-SILL PHOTOGRAPHY

A narrow board, covered with a strip of rough bark upon which grain can be placed, is attached to the ledge at right angles, the suet being placed at the base. This affords a fine perch. The pair shown here are Carolina chickadees, the smallest of the author's feathered visitors.

One was a kingfisher roosting on a bare limb partly canopied by foliage which projected over the margin of Whitefish Lake. It was startled from its perch when I flash-lighted a deer in the water below it. Kingfishers commonly sleep in their holes in banks along watercourses or in similar places, but such shelter was not available in this locality. Sometimes when my canoe brushed against the bushes or the rays of

the jacklight caused alarm, small birds could be heard and occasionally seen as they fluttered from their leafy retreats.

With few exceptions, land birds secrete themselves within a canopy of leaves, or in their nesting holes, if tree frequenters, or within the shelter of grass or reeds if they live on the ground. Even with such precautions they fall victims of the keen-eyed owls that, like ill-omened shadows, search for them on silent wings.

Many persons believe the attractive little screech owls with their mellow call notes are comparatively harmless mousers, but Dr. A. A. Allen's close observations of their habits near Ithaca, New York, have proved conclusively that they are exceedingly destructive to warblers and other little birds occupying the leafy coverts of treetops. Quail, ruffed grouse, and some of the larger small birds are destroyed by the barred and horned owls, which must have an almost microscopic vision to detect their

prey, which supposedly is protectively colored and concealed. To aid in the struggle for existence, Nature gives each species special equipment.

The roosting places of some gregarious birds, both large and small, often become conspicuous because of the numbers of birds resorting to some chosen locality. Especially is this true in or near towns.

The aggressive immigrants, the starling

and the English sparrow, have strong gregarious instincts that are evident both by day and by night. They are especially numerous about towns, where they maintain themselves in a way unequaled by any native birds. In Washington, as evening approaches, hundreds of each species seek regularly frequented roosting places about the corners of buildings or in certain trees in streets or parks, often within the full glare of electric lights. They have little to fear from visiting owls, but become such a nuisance from their droppings and their noise that they are subjected to raids by the police or are mobbed by indignant citizens.

At one time the picturesque walls of the Smithsonian Institution building were overgrown by a wonderful mantle of ivy, but the English sparrows found this afforded them such an ideal roost and safe breeding place that they became intolerable. In order to banish them, it was necessary finally to destroy the ivy.

A sycamore tree, about 25 feet high, standing in the middle of the sidewalk on Pennsylvania Avenue in a brightly lighted spot almost in front of the *Washington Post* building, was chosen as a roost by a large number of starlings. The popularity of this nightly resort was attested by the condition of the sidewalk below it each morning. Many pedestrians passing below carried away unwelcome mementoes. All



THE NUTHATCH LOVES SUNFLOWER SEEDS

Seeking them they come to the feeding perch at the author's suburban home in Wesley Heights, D. C.



THE TUFTED TITMOUSE IS EQUALLY FOND OF SUET AND GRAIN

It calls often at the author's window ledge and always does justice to the food offered. These little visitors soon learn that there is nothing to fear from their host. It is interesting to note, however, that some species avoid others, coming only when the feeding perch is deserted.

sorts of schemes were proposed to banish the nuisance without harsh measures, but it required a long campaign of rude assaults with the firehose and other weapons to convince the birds they were not welcome in their convention place.

Just as the country's capital is an attractive gathering place for our citizenry, so for the purple martins it is a good place for great conventions. After the breeding

season is over, in summer and early fall, they congregate and roost in the midst of the city until the final migratory urge takes them to their winter homes far to the south. A visit to their nightly gathering places is an exciting and unusual experience too often missed by bird lovers.

During the nesting season purple martins are scattered in innumerable small breeding groups, varying from one to 20 or more pairs over most of the eastern United States and southern Canada. They are well known because of their friendly occupation of nesting houses or boxes set up near the habitations of man. Customarily in ancient times, as they do occasionally today, they nested in old woodpecker holes or other small cavities in dead trees.

When the young are grown some mysterious impulse causes the birds from great areas to gather by thousands at common roosting places in the tops of trees, usually in the midst of, or close to, towns or large cities. These roosts have been observed from Massachusetts to California.

MARTINS THROG WASHINGTON ROOSTS

The first record of a martin roost in Washington was made in 1917 and they have appeared there with more or less regularity ever since. In each instance they have occupied the wide spreading tops of elms bordering busy streets. Two localities have been specially favored, one not far from the White House grounds, on 17th Street as it enters the Mall, and the other near the corner of New Jersey Avenue and L Street Northwest.

One season the number of birds in the Washington roost near the Mall was estimated to be about 35,000. In 1922 Doctor Oberholser estimated the number occupying the roost on New Jersey Avenue at 50,000. This roost was in elm trees over-arching the double tracks of a busy trolley line. It is usually occupied during July and August, but in the year mentioned it was tenanted throughout July and August and more than half of September.

The birds come in to their roosts from all directions and some from very high overhead as if arriving from a great distance. The noise of their wings and of the chattering cries from thousands of throats and the myriad dark forms descending from the evening sky makes a stirring event to witness. It is usually two hours or more

after dark before they become quiet for the night. Soon after daybreak they scatter to hunt their winged prey in the air over all the surrounding region, returning each evening. With them, but usually segregated at the edges of the occupied roost, there are sometimes thousands of grackles and starlings.

CROW ROOSTS ALWAYS IN WOODS

Virtually every one is familiar with the persistent habit of the common crows to seek food and to travel in straggling flocks almost throughout the year, but it is not so generally known that in the winter season throughout their range from the Atlantic to the Pacific coast, especially in the eastern half of the country, the crows in districts from about 40 to 80 miles in diameter gather nightly in great central roosts. The roosts are always in woods bordered by open country. There the birds mass until they blacken the treetops. As they come in from about sunset until dark, the increasing chorus of their loud cawing and gabbling makes a tremendous uproar, even more exciting than that of swarming purple martins.

One of the largest crow roosts on record was located for some years at Arlington, Virginia, across the Potomac from Washington. Dr. W. B. Barrows in the winter of 1886-87 estimated that from 150,000 to 200,000 crows came to it every night. About 1910 and for several successive years thereafter a great roost was in existence in one end of a small patch of woods on the border of the northeastern suburbs of Washington, about five minutes' walk from the nearest houses.

Many persons went out to watch the birds come in and always were well repaid by the stirring sight of tens of thousands of winged creatures in action. When this roost was in its decline in the winter of 1915-16, it was estimated to contain about 25,000 birds, but at its prime, about 1911-12, there were many more.

Fish crows sometimes join the common crows at these resorts from Washington southward, and in many places they have smaller roosts of their own, especially in Florida, where they gather nightly among trees bordering some of the numberless lakes or lagoons. When sharing a roost with common crows, they are segregated on the margin of the area occupied by their larger relative.

Before the passing of the neighboring roosts, the daily, long, straggling procession of crows passing over Washington mornings and evenings from and to their roosting places was such a familiar sight to all residents there that it passed almost or quite unnoticed, but at once attracted the attention of visiting observers. Today, in 1935, no crow roosts are known in the region about Washington.

NATURE DECORATES A TREE FOR THE YULETIDE

The wild plum tree, beneath my living-room window in Wesley Heights, has a seasonal calendar all its own. By April 1 Nature bursts into activity, decorating the tree with a mass of white blossoms—the pride of the neighborhood. In early summer the dense foliage affords welcome shade and shelter for many birds, some of which nest therein in perfect security, all impatiently awaiting the opening of their cafeteria in the early autumn. In November the coming of Jack Frost plucks the leaves, baring the twigs and branches as perching places for the assembling boarders.

One late December night the ground temperature was below freezing and a light rain fell. In the morning every branch



THE CAMERA CAUGHT A GRAY SQUIRREL IN THE AIR
He was jumping from the plum tree to the author's feeding platform.



A MOCKINGBIRD PAYS HIS RESPECTS
Perched at the author's window, he has a bite of suet and a chat.



A USURPER VISITS THE WINDOW LEDGE

Of course, the gray squirrel is welcome, but he keeps all the birds away until he departs. A pair of these animals deserted the premises when their tree home was blown down (see text, page 64).



WINTER COMES TO WESLEY HEIGHTS, 1935

Above on the left is the wild plum tree in its winter garb, in seasonal contrast to the fragrant, white blossoms of spring. On the upper right can be seen the feeding perches projecting beyond the window sill, which, when freed from snow, are open resorts for the hard-pressed birds. These feathered aviators follow their own air routes and, varying in color, size, and speed, resemble airplanes coming to a central landing field (see illustration, page 48).

and twig on the leafless plum tree before the library windows was coated with clear ice, and the tree sparkled like a structure of crystal in the morning sun. The refraction of the sun's rays produced a dazzling wealth of prismatic colors.

Into this beautiful setting came bright red cardinals and troops of brown sparrows. The whole ensemble created a veritable fairyland scene highly appropriate at the Yuletide.

A great mass of writings on the mentalities of wild things has been published without very satisfactorily determining their status and the exact relationship between

them. I have no desire to enter into this controversy, but wish to record some of my observations that bear on these subjects and to give my interpretations of them. I venture to add that in my opinion it is necessary to attribute to wild things the possession of similar mental processes to those of man when causes and reactions are essentially the same in the two groups of beings.

Furthermore, the fact should not be overlooked that the more completely man is dominated by the effects of civilization, the more his reasoning powers become developed and the more his instincts tend to become atrophied.

The instinct that helps guide a homing pigeon over unknown areas is improved by experience just as the inherited hunting instincts of dogs is further developed by training. It is common knowledge that by selective breeding almost any desired physical character may be developed into definite breeds of animals. To a certain extent I believe that special mental traits may be emphasized and increased, as has been done in certain strains of hunting dogs.

INHERITANCE OF TRAITS—ORIENTATION BY BIRDS

The same general process goes on in nature, but in an infinitely slower and more broken way. In trying to interpret hereditary characteristics in birds and mammals, I have often thought that to a certain extent the results of experience on the minds of individuals are inherited, and when such inheritance works to the advantage of the species it may develop into some more or less fixed characteristic or habit.

I am aware that many biologists doubt the transmission of such mental traits, but if inheritance of mental characteristics does not occur, whence comes the endless variety of peculiar habits, often of a complicated kind, especially in their nesting and feeding habits, among the many groups of birds? It is a general rule among birds for the female to do the incubating and care for the young, but in several species this task is taken over by the males. Such divergencies must have had an ancestral origin and have been passed down the line.

The faculty possessed by many birds of making long migratory flights in spring and fall to distant but more or less definite areas is primarily due to an instinctive urge. It is supplemented by keen observations of the land and water areas they pass over. Many birds migrate mainly during good weather and at night. The wildfowl travel either by night or day, according to weather conditions. Since practically all birds appear to lose their sense of direction in a heavy fog, it seems likely that observation of their course is essential.

Apparent local exceptions may be observed among the myriad sea birds which for several months fly out to their feeding grounds at sea and back daily through dense fog that covers the Fur Seal Islands and the adjacent parts of Bering Sea. This certainty of direction through the fog about



THE WHOLE FAMILY WAS ON RELIEF

A pair of bluebirds depended on the suet for themselves and young.

the Fur Seal Islands is no doubt assisted by the sound of breakers on the rocky shores and the voices of seals and birds, which may be audible for several miles.

It is known that those wandering oceanic birds, the shearwaters at Monterey Bay, on the coast of California, become completely confused as to the proper course of their flight when a heavy fog shuts down.

FORMER BOARDERS RETURN

When one interested in bird life maintains at different seasons and in different places a series of feeding stations, he has an excellent opportunity to become well acquainted with the varied beneficiaries of his bounties. At Wesley Heights, for instance, some of the birds, such as starlings, English sparrows, woodpeckers, and chickadees, remain throughout the year. Others, such as robins, mourning doves, catbirds, mocking birds, bluebirds, and grackles, come northward the last ten days in March to nest in this vicinity later and pass the summer and fall.

There are those that may be considered winter residents, numbering among them the blue jays and cardinals, which in the



THE YOUNG TURKEY BUZZARD HAS A WHITE BIB AND TUCKER

The cottony white down is worn early in life. This photograph was taken in a rocky niche in the gorge of the Potomac River, above Washington.

spring disperse in all directions to nest. Among the migrant birds are many that tarry at Wesley Heights for only a week or ten days on their way north or south. These include juncos, white-throated sparrows, and half a dozen species of warblers.

Whenever the seasons bring different birds to our premises, it is easy to single out those that have made this a boarding place previously, for such birds within a few minutes after arriving may be seen picking at the suet or eating grain from the tray or that scattered about on the ground.

It often takes newcomers a week or ten days to discover that their presence is welcomed by this household, and that the variety of food supplied is not only for their entertainment, but for the purpose of bring-

ing them into close contact with their hosts for the benefit of both.

While it is well known that migrating birds follow the same general course in their dual movements, the fact that many of these return to our half-acre lot to nest or feed shows pretty plainly that they have retentive memories, and that these pleasant recollections have helped them find their former resort, small as it is. This involves a reasoning power quite apart from instinct.

The modern system of bird-banding has done much toward determining accurately the seasonal movements of many migrants, but one who maintains a bird cafeteria is also in a good position to single out, on their return, the old customers from the newcomers.



CHAPTER V — PART I

Eastern Shore of Virginia—Earlier Visits to Revels Island

REVELS ISLAND, partly marsh and partly a low ridge overgrown with pines and cedars, is surrounded by extensive salt marshes and shallow bays. It lies about a mile to the southward of Little Machipongo Inlet, and the same distance inland from the sand dunes along Parramore Beach, on the Atlantic coast.

It is one of a group bordering the eastern shore of Virginia, between the open beach and the mainland. The islands are in Accomac County, one of the two counties forming the eastern shore of Virginia, and terminating the peninsula that also borders the eastern shore of Chesapeake Bay.

ISLAND OWNED BY SHOOTING CLUB

Revels Island, owned by the Revels Island Shooting Club, of which I became a member in 1894, comprises several thousand acres. It contains two large, nearly land-locked bays, sufficiently shallow to form feeding-places for ducks, geese, and brant; a few fresh-water ponds which are visited by black ducks; and many mud flats and sandy beaches attractive to shore birds. Several navigable channels give access by motor boat to most of the property, and at times of high tides many creeklike waterways penetrate other parts of the island otherwise inaccessible by boat.

Just south of the clubhouse is a long, broad, sandy beach, extending a mile east, and terminating in a sandy point. Across the water a similar point on Sandy Island combines with it nearly to enclose Revels Island Bay, which is the best feeding-place for ducks, geese, and brant in this region.

Nearly a mile north of the clubhouse is a long narrow ridge covered with yellow pines, cedars, and several kinds of bushes. At intervals of two or three years a very high spring tide occurs, and all the property except the ridge is covered with a foot or two of water. Once when I visited the island, the clubhouse and cottages were surrounded by the tidewaters, and no land was visible for many miles except the pine ridge and the distant main shore.

Because of these occasional floods, predatory animals, as a rule, avoided the area; although once or twice a pair of foxes appeared and made a den on the ridge, from

which place they were easily dug out by fox hunters. The ground-breeding birds, therefore, had no four-footed enemies, and those nesting in the trees apparently were rarely disturbed by owls. The only resident hawk was the osprey, which always lives on friendly terms with its neighbors. Bald eagles were not uncommon, but they lived mainly on fish taken from the ospreys, or on dead fish and dead or wounded ducks.

To the southward lies the long, ocean-washed Hog Island, which helps to enclose Broadwaters, a part of the eastern shore of a wide bay or sound that was once the favored shooting resort of Grover Cleveland.

The nesting birds had, however, one enemy that was present throughout the breeding season, and caused great havoc by destroying thousands of eggs and many of the nestlings. This was the fish crow. Members of the species apparently timed their coming to arrive on the island at the beginning of the period when food of this kind became abundant.

In May, under one tall pine, I found about 500 eggshells, most of them having a large puncture in one end. They were chiefly the eggs of the laughing, or black-headed gull, and the marsh hen, or clapper rail, but included, also, those of the green heron, grackle, red-winged blackbird, skimmer, and willet (see illustration, page 66).

EGGERS CAUSE SAD HAVOC

Other enemies of some of the breeding birds were the "egggers," including a large proportion of the natives of the Eastern Shore. Under local law it was permissible to collect newly laid eggs at the beginning of the nesting season. The eggs so taken were largely those of the laughing gull and the marsh hen. Gull nests were often closely grouped over several acres; consequently the eggs were easily collected.

One day I spoke to Jonah, the colored chore boy at the clubhouse, about a breeding colony of laughing gulls, and was surprised at the interest he displayed. I understood this a week later, when, on visiting the back yard at his request, I found a rounded heap of gulls' eggs, some four hundred in number. Dismayed at this sight, I voiced my disapproval.



THE FISH CROW GUARDS ITS OWN NEST BUT DESPOILS ITS NEIGHBORS'

On Revels Island these robbers are exceedingly destructive to the eggs of other birds. More than 500 empty shells of marsh bird eggs were counted under a tree where they had been dropped by them.



THE YOUNG ROBBER WILL SOON BE ON THE WING

In the nest in a cedar tree on Revels Island this fledgling fish crow awaits the time when he can join his parents at their piracy in other birds' homes.



REVELS ISLAND CLUB ADJOINS THE "SWASH" CHANNEL

The author's cottage stands in the foreground. The large open fireplace in the living room invited many an oyster roast. On such occasions the attendant guides deftly opened these delicious bivalves for those grouped about the cheerful hearthstone. A well equipped dark room promptly recorded the results of each day's camera hunt. To the right are the cottage of another member and the main clubhouse.

Whether or not such annual pillage has any serious effect on the number of young raised each season, the Federal bird law has outlawed the practice, although I do not doubt that eggs in considerable numbers are still collected each year.

When Jonah saw how annoyed I was by his raid on the gull colony, he sought to turn my thoughts elsewhere by asking if I had seen the big whale that was stranded on Sandy Island. I told him that I had not seen it, but that I thought it would afford a good opportunity for a modern version of Jonah and the whale, and that if he would sit in its mouth this could be accomplished.

Jonah replied: "Excuse me, boss, I don't want to go within 100 feet of that critter, for the smell is awful. Jes' wait till the wind comes from the west and you'll want to leave here and go home."

The clapper rails, called locally marsh hens, were abundant on Revels Island, but they lived such secretive lives in the tall grasses that, despite their harsh, cackling notes, they were rarely seen except when one made a painstaking search for them.

Each spring they returned from the South in extraordinary numbers, and skulked about among the grasses, rising and flying only a short distance when startled. At such times their weak flight makes them an easy target for the hunter. Their nests, neatly hidden under the overarching grasses, contain from 10 to 18 pale eggs that are comparatively large for so small a bird.

CLAPPER RAILS' EGGS PRIZED

As was the case with the black-headed gulls, thousands of the eggs of these rails were taken when they were freshly laid. Trained dogs were sometimes used to help find the artfully concealed nests. In seasons when heavy tides raised the water level of the marshes, an enormous number of eggs of the clapper rail floated from the nests and formed a drift line along the shores of the marshy areas. After the tide had receded, the birds lost no time in laying new clutches, and their great numbers appeared to continue undiminished.

The eggers argued with apparently demonstrated justification that a general



THE BLACK-HEADED GULL HIDES HER EGGS

Most of the nests of these birds on Revels Island were hollows made in drifted rushes and other vegetation along usually high-tide lines.



THE FISH CROW'S DUMPING PLACE REMINDS OF TRAGEDY

The eggshells shown here below a tall pine tree on Revels Island are a good example of the work of these destructive birds. These were stolen mainly from green herons, marsh hens, and black-headed gulls (see text, page 63).

robbery of the nests of the rails and the black-headed gulls for a short period under local regulation had no effect upon the numbers of the young birds reared each year. The robbed parents promptly proceeded to lay new sets of eggs. If the nests were repeatedly despoiled, the effect would unquestionably be harmful.

The wild-fowl shooting in the tidal waters close to Revels Island never equaled that in the sounds farther south. The peculiar shortage was due largely to the absence of fresh-water ducks, the black duck being the only one in this class found in abundance.

FLOATING BLINDS AND BOATS USEFUL

When I first visited Revels Island, many geese, brant, and broadbills (scaups), with occasional flocks of redheads, and a fair number of golden-eyes and buffleheads, or butter balls, frequented the region. This club was the first, I believe, to introduce floating blinds made of green cedar boughs stuck in buoyant wooden frames large enough to admit a ducking boat. Within these floating blinds a narrow, flat-bottomed scow was sometimes left during the shooting season for the use of the sportsmen.

Such a contrivance, when anchored, was always headed up wind, so that the decoys could be placed out to advantage. The hunter needed to watch only for the approaching birds, which, according to their habit, came in against the wind. Moreover, these floating blinds rose and fell with the tide; whereas it was difficult to shoot from stuck blinds at low tide, and an exceptionally high one exposed the boat and hunter. The floating blinds were set out before the arrival of the birds, which, in consequence, regarded the clump of cedars as a part of the landscape.



MANY AN OMELET, BUT TRAGEDY FOR THE BIRDS

In a few hours these 400 eggs of the laughing gull were collected for food by a native in eastern Virginia. This destructive custom is now being stopped under the Migratory Bird Treaty Act.

In those days no baiting was done, and it was essential to have the blinds located on good feeding-grounds or along narrow flyways. At first the shooting was satisfactory, but it gradually became poorer as the shallow bays were leased for oyster planting, and the near-by guardhouses, which were continuously occupied by watchmen in the fall and winter, became nuisances.

When naphtha launches, and later those propelled by gasoline, displaced the sailboats, these bays were kept in a state of continual disturbance, for with motor craft the lack of wind was no obstacle, but tended to increase activities.

FOWLERS HAVE AN INGENIOUS METHOD OF USING A BLIND

On the eastern shore marshes of Virginia, many of the black ducks have learned the danger of going to their feeding-places in fresh-water ponds by day, and seek them as the shades of night are falling. Taking advantage of this, the hunters have devised an unusual method of outwitting the wary birds. They make a high mound of marsh grass or seaweed near the side of the pond toward which the ducks usually come. Before the evening flight begins, the hunter, dressed in dark clothing, takes his place in



THE CATBOAT WAS FORMERLY USED ABOUT REVELS ISLAND

These craft are now replaced by motor boats. Note the shore bird decoys placed on the point of land.



THE RUDDY TURNSTONE, OR CALICO BACK, IS AN EARLY BIRD

This common spring migrant comes, usually in flocks, to Revels Island. It is a handsome visitor that deserves protection (see, also, illustration, page 75).

front of the blind instead of behind it, for the approaching birds would see his projecting head if he were looking over the blind from behind. Sitting in front, he blends into it and is invisible.

For many years some market hunters on the marshes of the eastern shore of Virginia have used the destructive method of netting black ducks at night. Both the netting of the birds and their sale have long been outlawed, but persistent efforts to break up this nefarious practice have not yet become entirely successful.

DUCKS NETTED BY POACHERS

Nets have about a two-inch mesh, large enough to permit a duck's head to pass through, but not to be withdrawn easily, since the feathers catch on the sides of the mesh. The nets are staked horizontally along the surface of the shallow water of natural or artificial channels, leading out from ponds frequented by the birds. Corn is then scattered in front and under the nets. The ducks, following the bait heads down, swim slowly under the nets as they feed. When their heads are raised they slip through the meshes and are held fast. Sometimes almost an entire flock will be taken by this means. The outlaws who do this are so well acquainted with the marshes and work so slyly that they are difficult to apprehend.

The marshes and mud flats about Revels Island were famous for the number and variety of shore birds that visited them during migration. Even when an alarming decrease in the numbers of these birds was noticed along the greater part of the Atlantic coast,



THE BLACK-HEADED GULL APPARENTLY ENJOYS LIFE

This handsome species, often called the laughing gull on account of its cries, comes to the marshes of Revels Island from the south in April and later breeds there in large numbers.

these marshes were apparently the stopping place of all the survivors.

It is not strange that eventually a tremendous decrease in shore birds was observed during migrations; for in the spring when the local shore birds were either nesting or mating every clubhouse from Virginia to New Jersey was filled with members intent on hunting shore birds at a season when all other shooting was prohibited.

WHOLESALE SLAUGHTER WASTEFUL

Day after day I have seen otherwise reputable sportsmen bring in 200 birds, and when the weather was warm it was practically impossible to keep such birds from spoiling. In the later years, convinced of its wastefulness, I gave up spring shooting,



DECOYS ENTICE SHORE BIRDS AT REVELS ISLAND

A pair of greater yellowlegs are coming in to the wooden effigies placed in a good feeding ground for them and for willet. The blind of small bushes or of rushes overlooks this peaceful scene.



PECTORAL SANDPIPERS, OR GRASS SNIPE, WANDER FAR

These common fall and spring migrants breed far north on the Arctic tundras and winter south to the Argentine plains. They are transient visitors to the tidal waters of Revels Island.



ROBIN SNIPE COME DOWN TO THE DECOYS

They were among the favorite shore birds shot at Revels Island in former days, in the course of the spring migration. The set of their wings indicates that their flight is being checked preparatory to alighting. Unsuspecting, they were doomed to extinction by overshooting until saved by the migratory bird law.



REVELS ISLAND POND ATTRACTS MANY FEATHERED VISITORS

A typical scene is glimpsed here across a strip of marsh and cedars to the wooded ridge on the middle of the island, where many birds nest. A willet stands in the foreground.

but, having substituted the camera for the gun, I was doubtless less tempted than some of the others.

In an article published some years ago, I related an incident of one of my May hunting trips with a camera. I was accompanied by a shooting companion, who fired at a clapper rail as it arose. When the wounded bird was retrieved by the spaniel, a blood-spotted egg was laid in the sportsman's hand. The incident immediately made another convert to the creed opposed to spring shooting.

SHORE BIRDS AT NIGHT ON REVELS ISLAND

After watching for many years the shore birds in their daily flight along the beaches and mud flats or about marshy ponds, I often wondered how they passed the night. Undoubtedly in the breeding season most of these little waders are more or less concealed

about the nests, but during their migrations they remain near the open water.

To test this question on Revels Island, I made two trips with a jacklight to the places much frequented by these birds in the daytime. The Hudsonian curlews I found massed in considerable flocks on flats just above high tide, where at one time they were shot by natives with the aid of a kerosene torch or lantern. Flocks of sandpipers, turnstones, robin-snipe, and a few black-breasted plovers were seen squatting on the sandy shore, or on mud banks, while dowitchers were in the scanty grass a few yards farther back. Species that did not gather in large flocks by day, such as the yellowlegs, willet, ring-necked and semipalmated plover, were not seen. Being more or less solitary in habits, they were probably concealed in the vegetation back from the shore or about marshy ponds.



LITTLE JERRY, THE OX, WAS A COMICAL FELLOW

This dwarf was used for many purposes at Revels Island, where his odd ways made him an amusing local character (see text, page 81). Here he is hauling a load of cedar boughs.



THE OYSTER CATCHER SHOWS CLEVERNESS IN HIDING ITS NEST

This bird's artful placing of its eggs on bare sand among scattered shells and other small objects which serve as a natural camouflage renders them very difficult to find.



PECTORAL SANDPIPERS, OR GRASS SNIPE, ABOUND AT REVELS ISLAND

The camera bagged more than 125 birds at this shot as they flew over the decoys. Exposure for the picture was one-thousandth of a second. It is exceedingly difficult to photograph such small, swift flyers on the wing.



A TREE SWALLOW'S NEST IS COZY

The side of the dead tree was cut away to expose the white eggs and feather-lined nest of this common little bird. After the opening was closed, the birds went on with their housekeeping.



CALICO BACKS ARE SWIFT ON THE WING

These cheerful migrants, known also as the ruddy turnstone, come regularly to Revels Island in the spring. They are often seen standing on a rugged headland near surf (see, also, illustration, page 68, lower).



THE BLACK SKIMMER BUILDS NO NEST

It lays its eggs on the sand, where their protective coloring makes them difficult of detection. The casual passer would hardly distinguish them from pebbles.



THE COMMON TERN UNDERSTANDS CAMOUFLAGE

These birds were among the several waterfowl that used the sandy belt back of the tide line on Revels Island for a nesting place. It requires sharp eyes to find eggs so blending with the sand.



THE WILSON'S PLOVER IS A HANDSOME BIRD

This small coastwise migrant has always been common on the sandy beaches at Revels Island, which is near its northern breeding limit.



FOR ITS EGGS THE WILSON'S PLOVER HAS A NEST OF SORTS

It does not rely entirely upon the naked sand but chooses a spot a little secluded. Compare the nest of the common tern on the opposite page.



THE YELLOW-HAMMER, OR FLICKER, PAUSES AT THE DOOR OF ITS NEST

This picture was taken with a portrait lens in 1899, the camera being concealed in a bush four feet away. The author, twenty yards away, pulled the string.



THE LITTLE GREEN HERON HAS AN AIRY HOME

A considerable number of these birds breed among the cedars in the interior of Revels Island. Many of their eggs and young become victims of the fish crows. No other heron bred there, but a colony of great blue herons was located on an opposite island.



THE BARN SWALLOW MISSES HIS OLD HAUNTS

This nest located under a little shelter in the wreck of an old building on Revels Island shows how ingeniously birds take advantage of favorable conditions. Barn swallows do not readily find in modern buildings the congenial nesting places old-fashioned barns provided. They do the best they can with such makeshifts as this.



A FLICKER MAKES A SECURE NEST

A pair of these birds made a hole for a home only about five feet from the ground in a dead stub near the Revels Island Clubhouse. An opening cut into the nest revealed two glossy white eggs. Then the opening was covered, leaving an entrance for the birds, and they continued using it.

In the course of my visit to Revels Island a marked transition took place in the oyster industry. In the early years I saw oysters dredged from the deeper waters of the small bays and channels, but these shell fish gradually decreased until the business was threatened. The wild oysters varied greatly in size, and it became increasingly difficult to find a sufficient quantity of the standard sizes to meet the requirements of the market.

OYSTER FARMING INTERFERES WITH WILD FOWL

Finally the State of Virginia leased the best oyster grounds to individuals, although some of the beds were barren of oysters at the time. An abundance of old shells and some living oysters were strewn on the bottom to afford attachments for the oyster spawn, and this method of water farming soon proved so successful in producing desirable shell fish that a state of warfare developed between the lease holders protect-

ing their property and those called "oyster pirates," who believed they had an inalienable right to anything produced by the sea. In order to protect the planted oyster beds it finally became necessary to station guards armed with rifles along the shore during fall and winter. Small houses were built near by for their accommodation.

The establishment of the guards in all the best bays of the region had a disastrous effect upon the wild-fowl shooting. Geese, brant, and ducks were accustomed to feed and rest in the bays, especially in rough weather. No sooner did a flock of birds settle on the water, however, than the nearest guards would send rifle balls into their midst, driving them out to sea or into the big bays, where they would remain until darkness enabled them to return in safety. In the same period the few sailboats were displaced by many noisy motor boats that kept the birds in constant alarm.

THE AUTHOR REFRAINS FROM SHOOTING INTO A VORTEX OF DUCKS

On the Eastern Shore there was as a rule no noticeable increased migratory flight on the approach of cold weather, but the birds arrived in easy stages from the North, as the waters there were gradually chilled. This was in contrast to the movement in spring when the wild fowl passed in almost continuous flights to their northern breeding grounds.

One afternoon in November, 1896, I was occupying a floating blind in Revels Island Bay. A strong, cold north wind, the first of the season, foretold the coming of freezing weather. Looking toward the north, I saw what appeared like a cloud in the otherwise clear sky. Soon it was apparent that an immense flock of ducks numbering thousands was approaching high in the air.

When the travelers sighted the broad shallow waters ahead, they swooped downward with a roar almost like that of a western cyclone. From a great height the birds descended in a graceful spiral. Three times this vast flock of scaups, for such they were, hurtled over the blind, dropping several hundred yards at each turn, making a sound with their wings resembling the sighing of a high wind in the treetops. Finally the visitors passed low over my decoys and alighted all about me with a tumultuous splashing, some almost striking the brush blind in which I sat.

Although tempted to shoot into the crowded ranks, with the prospect of dropping half a dozen birds, I restrained the impulse in order that the hungry and tired ducks could enjoy a period of rest, and thereby be induced to remain a day or two longer. It was a delightful experience to sit concealed in their midst. Some of the scaups splashed about vigorously, taking refreshing baths, some immediately began diving in search of food, and some faced the wind in little groups with heads drawn down on their shoulders, weary from the long flight.

No doubt among this flock were many ducks that were familiar with the attractions of this locality through visits during former seasons. They guided in the inexperienced youngsters of a new generation, even though they may previously have seen many a companion fall before the gun, an inevitable peril that these migrants must face wherever may be located their winter quarters.

As the wind and the tide forced the flock toward the opposite shore, I quietly withdrew, content in not having collected any toll from these newly arrived wanderers.

MEMORIES OF AUNT CAROLINE'S COOKING STILL LINGER

Aunt Caroline, a faithful and proficient colored cook, had charge of the club kitchen for more than a generation. She was always appreciated and was regarded as one of the club's valuable assets. Living in a State famous for its culinary art, she had few equals. The making of delicious clam chowder was one of her greatest accomplishments, and large clams were always available on a sandspit only about 100 yards away.

Early in the fall a goodly supply of oysters would be gathered from distant bays and placed in the shallow water on both sides of the long dock. Sometimes between meals a guide would wade out and get a basketful of them, which would be opened and eaten by us on the sunny side of the boathouse. Aunt Caroline served the oysters in several ways.

In the winter months, eels speared in their hibernating places in the mud at the heads of creeks were another delicacy on the bill of fare. In the hunting season Aunt Caroline produced the most appetizing dishes of perfectly cooked ducks and shore birds, besides stewed terrapin and



GREEN HERONS PERCH ON A BRANCH

These little birds are among the most cheerful and welcome of the visitors to Revels Island. Like many of their neighbors, such as the black-headed gull, the clapper rail, the grackle, the red-winged blackbird, the skimmer, and the willet, they are victims of marauding fish crows which rob their nests of eggs.

snipe potpies. The memory of her pastries, including apple and pumpkin pies, puddings, doughnuts, and other tasty products of her skill, still remains with me. Even the little tin lunch pails that were sent out to the blinds with us were like little Christmas boxes with their varied assortment of good things to allay the hearty appetites we had sharpened by hours in the open air.

LITTLE JERRY, THE OX, WAS A FAMOUS CHARACTER

One resident on Revels Island familiar to all the club members for many years was Jerry the ox. Although he was almost a dwarf of his kind, his black and white figure was considered an ornament to the flat landscape. He served us in many useful ways, and his doings afforded both exasperation and interest. Harnessed to a little cart, he hauled coal and wood from the dock and building material for new structures. He carted decoys and other material to ponds inaccessible by boat, and brought



YOUNG PURPLE GRACKLES COME OUT TO ENJOY THE SUN

Three little birds sit on a limb and wonder perhaps what the photographer is doing as he catches them with his camera.

such produce as pumpkins, beets, turnips, and sweet potatoes from our productive garden on the higher ground to the root-house under the kitchen (see illustration, page 75).

None of these duties was to Jerry's liking, and whenever he saw the scow tie up to the dock, or noted any other occurrences that he had learned to associate with distasteful chores, he would quietly disappear. Later he would usually be found ensconced in a brushy thicket on the wooded ridge farther inland. Once the search for him seemed fruitless, and it was thought that he had probably crossed the channel to another island.

He was eventually discovered hiding behind the timbers of a wrecked schooner half a mile down the beach, from which point of

vantage he was able to view the prolonged search with apparent enjoyment. When once harnessed to the cart, however, he was docile and energetic enough, so that his elusive ways were looked upon with tolerant amusement.

Because of the mild climate, no special shelter was provided for Jerry. When a cold wind blew, he would take

refuge behind one of the buildings or amid the thickets of the little pine woods on the ridge.

His four-footed companions were the half dozen young hogs that each season grew fat on the swamp roots and other food they could gather in the marsh or along the shore until the time arrived when they were converted into ham and bacon in the smokehouse.

JERRY WAS A PHILOSOPHER

When the day of slaughter came, Jerry always looked on complacently as if approving such disposal of the grunting creatures, which had never appeared to pay the slightest attention to him. For a long time Jerry was regarded as one of the odd characters of the locality.



CHAPTER V — PART II

Last Days at Revels Island

LIKE many other members of the Revels Island Club, in the middle nineties, I visited the shore in the spring not so much for shooting at a time when other game was protected as for enjoying the beauty of Nature throwing off her drab winter garment and replacing it with green, swelling buds and unfolding leaves. This beauty, the gentle warmth of the sun, and the soft spring breezes constituted a welcome change to residents of more northern latitudes who loved the out-of-doors.

To Revels Island during these balmy days came nearly all the species of shore birds that inhabit our Atlantic coast. Some were en route from their winter homes in South America to their breeding grounds beyond the Arctic Circle. There were others

that nest in less distant places, as well as those that remain to rear their young along the Eastern Shore. Though the different species arrived at different times, each form had its special schedule of arrival and departure.

First to appear were the jacksnipes, or grass snipes, which usually kept to the mainland, for the fresh-water meadows were to their liking. These were followed successively by Hudsonian curlews (many of which had wintered in South Carolina), willets, greater and lesser yellowlegs, numerous species of sandpipers, plovers (ring-necked, Wilson's, and black-breasted), turnstones, dowitchers, and knots or robin snipe.

In those days the wastefulness and cruelty of shooting birds that were already mating,



THE NEST OF THE CLAPPER RAIL IS ADROITLY HIDDEN

Built beside the tidal waters it was artfully covered with scraps of vegetation whenever the bird left it so that it resembled the surrounding drift matter. The eggs, proportionately large for the size of the bird, are very palatable and are gathered in great numbers by the natives of the Revels Island region.



THE CHUCK-WILL'S-WIDOW RESTS LYING DOWN

This picture was made by the author 35 years ago. It shows the bird in characteristic position crouching on a limb. The legs and feet are not visible until it rises for flight.

or those that were actually in the midst of their nesting activities among the broken shells of the seashore or in tussocks of grass in the marshes, were not appreciated until several species were approaching extinction.

Because of the large number of species, each with its peculiar habits, shore-bird shooting at the island afforded a far pleasanter and more varied form of sport than did the wildfowling in the adjacent bays, where the salt water appeared to have attractions mainly for scaups, golden-eyes, geese, and brant. Comparatively few kinds of waterfowl were to be found in the vicinity of the island, although not much farther to the south, on Back Bay and Currituck

Sound, were millions of marsh and deep-water ducks, together with tens of thousands of greater snow and Canada geese and whistling swans.

An ample supply of wooden and tin decoys, shaped and painted to resemble the larger or more desirable species of shore birds, was available at the club. In a catboat with a large leg-of-mutton sail the gunner was conveyed by his guide from the clubhouse to a blind, which, the direction and force of the wind being considered, was best located for the purpose in view.

In hunting curlew, fowlers often dug a pit at the edge of a sand point in the marsh where the birds were accustomed to feed as the receding tide exposed the mud flats. When the tide was rising, the curlews followed the narrow channels through the island, alighting to rest on the grassy flats along either side.

In such places, the hunters, well concealed behind grass blinds, could enjoy flight shooting.

These birds were favorites with many sportsmen because of their size and slow, steady flight. Their large, compact flocks could be seen a mile or more away, as they came in to their feeding or resting places. If the hunter wished to shoot yellow-legs or willets, he would occupy a bush blind close to the edge of a little fresh-water pond, in the mud and shallow water of which the decoys would be placed in such spots as these birds commonly frequented when feeding.

The turnstones gathered on the mud banks bordering the larger bays in company



ITS EYES GLISTEN AT NIGHT LIKE A CAT'S (SEE TEXT, PAGE 179)

The chuck-will's-widow lies flat on the ground. This picture and that on the opposite page show the peculiar habit of this bird when it is resting.

with the smaller sandpipers that preferred the open shores. Because of the small size of these birds and their habit of flying in compact flocks, the gunners were able to bring them down in such numbers, sometimes a dozen or more at a shot, that they provided the material for many a delicious potpie, a welcome relief from the products of the frying pan.

CAMERA HUNTING BIRDS AND NESTS ON REVELS ISLAND

Toward the end of the season, about the middle of May, flocks of robin snipe frequented the exposed sea beaches, and for years they afforded excellent shooting. After a time I became seriously alarmed about the future of these handsome birds, for they began to decrease rapidly in numbers, and late in May, 1904, I made a special trip to Revels Island to obtain pictures of what I feared might be a doomed species.

All day I remained in a blind with my camera before a flock circled over the decoys. The marked difference between hunting with a gun and with a camera was here demonstrated. Had I discharged a gun at this flock, a few birds might have been

dropped, and the rest would have hurried on in wild alarm toward their far northern home. As it was, I obtained a fine series of pictures of the entire flock as its members circled back time after time to satisfy their innocent curiosity concerning the strange wooden counterfeits.

During the days I passed in the blinds I was much interested in noting the skill with which some of the local guides imitated the notes of these birds. Often when the birds were passing on their northward flight, or were merely seeking new feeding grounds after having been disturbed by a rising tide, they would pass our decoys, which were strung out near shore, without paying them the least attention.

The guide at my side in the blind would imitate the note peculiar to the species that was passing, and very commonly the flock would respond by swinging in on a graceful curve that would bring them within gunshot. If we did not shoot, they would alight among the decoys, where we could photograph them at our leisure.

Nature photographers, especially beginners, find much enjoyment in picturing the nests and eggs of birds to be found so



A WILLET ON THE WING GOES FAST

The bird shown here is flying from its nest in a clumsy, grotesque manner to draw attention away from its treasures. Such flight pictures are exceedingly difficult to take (see text, page 93).



THE WILLET HIDES ITS HOME WITH GREAT SKILL

The nests are concealed by overhanging grass that must be bent away to expose the eggs. If an intruder approaches, the bird leads him away by awkward flight, as in the upper picture.



A CLAPPER RAIL SITS SNUGLY AT REVELS ISLAND

When incubating under cover of the canopy of marsh grasses, this marsh hen is almost invisible. On leaving the nest, it pulls over it the surrounding grasses (see text, page 94).



THE CLAPPER RAIL LAYS A LARGE CLUTCH

Even when the bird is gone the eggs, which sometimes reach 18 in number, are not seen readily except when the overhanging grass is pushed aside, as in this photograph.



ONLY A KEEN AND EXPERIENCED EYE CAN FIND IT

The meadowlark's nest is so well concealed by overarching grass that it is espied with difficulty.



CLEVER CONCEALMENT SPELLS SAFETY

The bob-white quail nest, filled to overflowing, is skillfully hidden. The photograph was taken on the mainland near Revels Island.

readily in most country places. The more ambitious of them photograph the parent bird on the nest, or when it is feeding its young. In many cases the notes made by these amateurs have proved of value to ornithologists concerned with the home life of our birds.

At first, being interested mainly in game animals and birds, I neglected opportunities to get pictures of the nests, even of rare birds. Moreover, I was seldom in the forests in May or June, my outings occurring usually at a time when the birds were already hatched and on the wing.

After many visits in spring to the island as a sportsman, I went there to make photographic records of the birds and their nests. Once on going to photograph the northern flight of the robin snipe, I found that the movement had not yet begun, and after waiting a day or two, I decided that it would be interesting to look for the nests of breeding birds. Such a search should result in a fairly complete census of the summer-bird residents of the Eastern Shore. How fascinating this endeavor proved.

On the first morning of my quest I left the cottage with a small camera affixed to a tripod for use in taking pictures of stationary objects at close range. This was the outfit that I had used in photographing fungi in the forests of northern Michigan. First I went down on the sand beach that extended for nearly a mile along the southern end of the island.

I had never hunted on this beach but had often walked its entire length for exercise after a day in the cramped confines of a shooting blind, and frequently had brought back a basket of clams for Aunt Caroline to convert into one of her famous chowders. In addition to sanderlings, turnstones, and other migrants, the birds that inhabited this beach in the spring included a number of species that remained to breed, and it seemed quite certain that on the sand above high tide some nests could be found.

After I had gone a few hundred yards along the beach, I saw the black and white figure of an oyster catcher near the edge of



WILLETS HAVE BUILT AN ISLAND HOME

They have constructed their nest on a tuft in a marsh.

the water, but it took wing as I approached. Closely examining the upper beach near the place where it had appeared, I found two heavily spotted eggs in a little hollow where the sand had been scratched out. The eggs were surrounded by a number of broken sea shells as if an attempt had been made to outline a crude nest or to camouflage the eggs. I photographed the eggs and continued my walk.

A TERN UTTERS PROTEST

Soon afterward I discovered three dark-colored eggs with dark spots in a depression in the bare sand, but no parent bird was visible in the neighborhood. As I was focusing the camera on this new find, the identity of the owner was established by the arrival of a common tern, which flew over my head protesting loudly.

As I approached the end of the sandy point, I observed a pair of black skimmers on the beach, but I doubted that they were nesting there, since these birds had a large breeding colony on Hog Island, on the opposite side of the channel. I was pleasantly surprised, therefore, to find their nest in this unexpected place.

After I had photographed it, I retraced my steps to the clubhouse along a line of small sand dunes covered with bunches of grass, from the direction of which the notes of Wilson's plover had sounded as I came down the beach. In that vicinity I had frequently seen these pretty little ring-



THE OSPREY SEEMS THE SPIRIT OF FREEDOM

Each year a pair of these fish hawks reoccupied their bulky nest of previous years located near the top of a large dead pine, where the lower quarters of the structure were occupied by blackbirds. They are heavy but skillful aviators, wheeling at apparently impossible angles, and darting down like arrows to capture the unlucky fish, which swims near enough to the surface to be detected by their keen eyes.

necked plovers. After a considerable search I found a set of their eggs on the sand and added a photograph of them to my collection.

Two days later I returned, and by concealing the camera a few feet away, with a thread running about 75 yards to some sheltering bushes, I was able to release the shutter while the parent bird stood close by the eggs (see page 77). On my way back to the cottage, as I was crossing some low, wet ground covered with long grass, a pair of willets flew about close overhead, uttering cries of distress—behavior that indi-

cated that their nest was close by. Careful search, however, failed to disclose the nest they were guarding.

These birds are remarkably skillful in concealing their eggs. I was probably led astray by the cunning maneuverings of the birds, which showed apparent anxiety first in one place and then in another. The willet is one of the few species of shore birds that nest as far south as Virginia. I saw many willets in Florida in winter. The migratory flights of some of these birds seem to be comparatively short.

Abandoning the search for the nest of the willets, I returned to the clubhouse, in the vicinity of which I hoped to obtain another picture. The buildings were surrounded by several acres of tall, thin grass that afforded some grazing for Jerry, the ox, in addition to harboring myriads of mosquitoes that could not be dislodged, even by the heaviest winds off the ocean. If a per-

son wearing black garments passed through this grass in the spring, in a few minutes the black on his back would turn to a uniform brown from the host of mosquitoes alighting on it. Fortunately, in the daytime these insects were not very vicious, and at night well-screened windows prevented them from being annoying.

This grassy locality was the resort of a pair of meadow larks that could be seen flying about at all hours of the day, and heard singing musically mornings and evenings. That these birds were nesting on this little island, surrounded by miles of

salt marshes, and so far away from the mainland, would have seemed unlikely to me had not their actions indicated that they were housekeeping.

Several times I had observed one of the birds descend into the grass near a small cedar. Approaching the spot, I searched carefully and at length discovered a pyramid of grass tops, like a little Indian tepee, under which was a nest containing four eggs. Parting the grass, I photographed the cleverly concealed nest and then restored the canopy to its original position.

By this time I had photographed the nests and eggs of five quite different kinds of birds, and before attempting any further subjects, I decided to develop the plates to learn whether the camera was doing its duty.

The developed plates proved to be satisfactory, and I started out the following morning to visit a breeding colony of laughing gulls.

These birds had been seen circling about the marshy end of a bay situated about half a mile west of the clubhouse.

Before departing for the bay, I asked Jonah, the colored chore boy, whether the gulls had begun to lay. He replied that he had been down there a few days before, and that he thought that more than a hundred pairs were nesting.

Approaching the edge of this marsh, I found a place where the wind and waves had beaten down the bushes along high-tide mark, and where considerable debris had lodged. Wherever there was a flat surface



IN AERIAL MANEUVERS THE OSPREY EXCELS

Rising, descending, soaring or reconnoitering, this bird is conspicuous along the shores. As a disciple of Izaak Walton, like the kingfisher, it may, in a practical sense, be regarded as a connecting link between land and water birds, for both live continuously along a water front and depend wholly upon fish taken on or near the surface by a skillful, arrow-like plunge from high above.

of rushes or other material a foot or more in extent, a pair of gulls had hollowed out a small depression and had laid their eggs. very little effort was expended in constructing a nest. I took several pictures of these crude nests.

As I returned to the clubhouse the sight of a flicker led me to try to locate the nest of the pair of these birds that had been seen flying about a little south of the houses. A short search revealed a dead pine stub containing a nesting hole only five feet above the ground. Placing the tripod and camera within a few feet of the tree, I fas-



LIKE A HUGE LEAF IS THE OSPREY

In flight it soars, wheels, and darts in graceful maneuvers, though it is rather slow awing. Any high treetop may be its momentary perch.

tened a string to the shutter and moved off a short distance. In a few minutes a flicker alighted on the side of the stub close to the entrance to the nest and helped me to a satisfactory picture (see page 78).

I next explored the pine ridge, where I expected to find the nests of many other species of birds. Low ground, through which ran a tidal creek, separated the grounds surrounding the clubhouse from the ridge, and across this an elevated board walk a quarter of a mile long had been built. This made it possible for one to visit the pine ridge even in times of high tides.

In a small bush close to the boardwalk I discovered a little nest containing four speckled eggs. It was impossible for me to identify the bird as it flew away, but later I was convinced that it was a seaside finch, a rather common bird in those marshes.

In an old clearing on the ridge stood the ruins of the first clubhouse, which had been built in 1885. In a sheltered nook of the ruined structure, a pair of barn swallows had built a nest. Close by, a pair of tree swallows was found nesting in the bottom of a hole in an old stub. With a little

saw I cut an opening to the nest and exposed the four beautiful white eggs on a soft bed of feathers. After taking a picture, I nailed the strip of wood back in place so that the birds could continue their house-keeping undisturbed (see page 77).

From this place I went westward to a patch of low cedars, which sheltered a dozen nests of the grackle. These structures, large and deep, were composed almost entirely of coarse swamp grass with a finer lining. After taking one photograph of a nest showing the eggs, I found another nest in which the young were nearly ready to fly. They were placed in a row on a neighboring branch on which they sat for their portraits, and appeared to be quite unafraid. Meanwhile, the mother bird protested vehemently (see page 84).

Beyond this point, at a place where deciduous bushes replaced the cedars, I saw a flash of brown and recognized the slender, graceful form of the brown thrasher with which I was so familiar in the winter quarters of the species in Florida, as well as during the spring and summer in the District of Columbia. A short search revealed that it also was nesting, and I took a photograph of its neat home. In some little bushes that grew among the heavy grass in damp open ground between the trees on the ridge and the open marsh a number of red-winged blackbirds were nesting, and these made easy subjects for the camera.

From the border of the marsh I turned toward the east to examine the wooded ridge near the site of the old clubhouse. As I approached some large yellow pines, several fish crows departed hurriedly and thus betrayed the presence of a half dozen nests. These were beyond reach, however, without the aid of a ladder or strips of wood nailed to the tree trunks.

Leaving these nests for later attention, I went on to another group of low cedars, very much like those in which the grackles were nesting, and here found many nests of the little green heron. They were flimsy structures, consisting of loosely built platforms of small sticks with saucer-shaped depressions in the tops for the eggs. One nest that I photographed held four greenish eggs, and another contained young birds four or five days old.

The green heron is the smallest and one of the most common of the true herons of North America. When perched in a tree, it usually sits with its head drawn down

so that it has the appearance at a distance of a rather unattractive bird. But when standing alertly upright, it discloses all the grace of form usual to its kind. At a distance it looks dull and dingy in hue, but when held in the hand it reveals exquisitely blended variegated colors.

Although usually solitary in habits, during the nesting season the green herons gather in small groups or colonies in their chosen breeding places. The birds are so frequently seen as they rise and fly along the course of small wooded streams that in some parts of their range in the eastern States, the species is commonly called "fly-up-the-creek."

Not far from the colony of green herons stood a dead pine in which was an osprey's nest. Near this I built a blind of bushes and focused on the nest a camera equipped with a large lens. After a wait of only a few minutes the parent birds began flying about and I was able to obtain a series of photographs showing them circling about on outspread wings or perching on the nest.

Ospreys, or fish hawks, have long frequented the large salt marshes along the eastern shore of Virginia, where the meadows are penetrated by small bays and tidal creeks in which there are many fish that attract them. In many parts of the marshes, however, no woody growth is found other than bushes too frail to support the bulky nests, and the ospreys must carry their catches miles away to their young.

OSPREYS BUILD NESTS ON CROSSBARS OF TELEPHONE POLES

Several years after a life-saving station had been established on Parramore Island and a telephone line had been built across the Revels Island marsh, the ospreys began building their nests, precariously balanced, on the top crossbars of the telephone poles. These interfered so seriously with the working of the line that all the nests were destroyed. Sometimes the birds built nests on the roofs of cabins in the marshes.

I had not as yet located and photographed the nests of the willet and the marsh hen, two game birds in which I was particularly interested, and which were unusually abundant on Revels Island during the summer.

While I was taking the osprey picture, I noticed several willets flying back and

forth over a little fresh-water pond, a short distance away in the marsh. As I approached the place, a willet sprang up from the tuft of grass on a little hummock surrounded by water. Although I looked carefully, I could see no nest, but when I parted the tall grass I discovered one containing four eggs. Pushing the grass to one side I took a picture and then restored the grassy cover (see page 91).

Soon afterward I obtained two additional pictures of the nests of the willet, but could not get one of a bird on the eggs. The bird would fly away as soon as I approached. It usually alighted in the grass at some distance and returned to its eggs under that cover so stealthily that I never knew just when it arrived.

PHOTOGRAPHING A WILLET IN FLIGHT

At one place I stuck a stick in the ground as a marker about eight feet from the nest. Then I focused the camera carefully ready for a shot later, and retired for half an hour. Setting the focal plane shutter at 1/1000 of a second, I stalked cautiously up to the marker and aimed the camera several feet above the nest. I had just got in the proper position when the willet sprang through the concealing grass, and the picture I obtained shows it hurtling through the air (see page 86).

The tall, stately willet is one of the handsomest of our shore birds. The variegated plumage of its back is brownish gray, black, and white, and the secondaries and part of the primaries in the long tapering wings are brilliant white. The bird is strikingly beautiful in flight. During the nesting season it incessantly utters loud ringing cries, *pilly-will-willet*, *pilly-will-willet*—as it flies about or hovers over the head of an intruder in its nesting ground. It is the only shore bird, so far as I am aware, that tries to protect its nest. I have found it nesting from northern Florida to Delaware, the breeding range on the Atlantic coast being comparatively limited.

Hundreds of marsh hens, or clapper rails, nested within a mile of the clubhouse. Their nests were usually built within fifty feet of the upper tide limits or about fresh-water ponds. Like the nests of the willet, they were well concealed from the keen-eyed crows that flew continually about the marshes in search of eggs. They were placed in thick grass or rushes and covered with grassy canopies.

I found that by zigzagging back and forth near the water, especially during high tide, I could easily flush the birds, or, if they were absent, could discover the nests by looking beneath every wisp of grass blade such as is woven above the eggs by the parent bird. At the time of my search the nest contained from four to 16 eggs. In those having 16 incubation had begun.

I parted the grass concealing one of these completed clutches of eggs and took the picture shown in the text. I then placed a small camera covered with grass in front of the nest where hatching had begun, and twisted back the concealing grass so as to expose the eggs or the setting bird. I attached a thread to the shutter so that by pulling on it I could take the picture when I was about 50 feet away.

After a short absence I cautiously returned, none too soon to get the desired photograph. The mother bird was sitting on the nest busily engaged in pulling back, with little jerking motions of her bill, the grass blades I had disturbed (page 89).

The next morning I returned with some slats to nail on a pine tree containing a nest of the fish crow, and had little difficulty in getting a satisfactory picture (see page 66).

FISH CROWS DRIVEN AWAY

The following year I was able to climb up the same tree and get a photograph of a nearly grown young crow, the two others having left the nest while I was focusing the camera. When the extent of the depredations of the fish crow on other nesting birds was fully realized, the superintendent of the club was directed to destroy all their nests found on the place. This was done with a shotgun, and most of these pests were driven away.

The last nest I photographed was that of a bob-white. It was located near tide water on the mainland opposite the island, and was well hidden in dense grass growing in a fence corner. It contained 15 eggs.

In the week I devoted to nest hunting I took photographs of 18 species, which were fairly representative of the birds most commonly living there during the breeding season. By concentrating one's efforts on a given area typical of the surrounding country, one can obtain a series of pictures that affords evidence of the birds nesting there, and that indicates their conceptions of what constitutes a desirable home. In many instances efforts apparently had been

made by the birds to conceal or camouflage the eggs and later the young.

I often neglected to take the picture of a bird or animal when occasion offered, believing that this could be done, possibly more conveniently later. Delay, however, is poor policy when dealing with wild things, for they are subject to many more vicissitudes than are tame creatures.

PROCRASTINATION THE ENEMY

As a striking illustration, I might cite my failure to photograph the largest osprey nest I have ever seen. It was in the top of a tall dead pine on Revels Island, where during many successive seasons I saw the structure grow in bulk by annual additions. The tree was an outstanding one in a grove north of the clubhouse, and so large and elevated was the nest that it constituted a conspicuous landmark for visitors seeking the island.

Year after year I passed this tree always with the thought that some day I would photograph it with the osprey perching on its huge structure or circling over it. Time passed without my doing so, however, until one afternoon in the spring of 1902 I examined the locality to determine the best place in which to conceal the camera in order to obtain the long-desired picture which I planned to take the next morning.

An unusually heavy northeaster occurred that night. The club buildings creaked and rattled under the strain, but, comfortably sheltered, we enjoyed the rush and shrieking of the wind and the booming of the surf along the shore.

The following morning dawned clear and warm, and, shouldering my tripod and camera, I set out to photograph the osprey's home. Reaching the spot, I found the gaunt dead pine prone on the ground and the nest reduced to a great mass of sticks and other material. That the tree had sunk slowly to the earth under the force of the wind was indicated by the three unbroken brown-blotted eggs of the hawk that lay on the ground beside the nest. Among the debris were seven or eight smaller, bluish eggs of grackles, which had been unceremoniously ejected from their big, rent-free apartment house by the catastrophe that had overtaken their landlord.

Millions of shots are fired every season at ducks passing over decoys, or on flights to feeding or resting grounds. Unless a duck is shot through the head or other vital organ, or comes down with a broken wing,

it may not be apparent that it has received a wound that will cause death in a few minutes by internal hemorrhage. Every gunner, therefore, should observe closely a departing bird that may have been hit, although it shows no evidence of injury.

Frequently a wounded bird will suddenly drop after it has flown several hundred yards, very commonly when the gunner is reloading his weapon or has his attention otherwise distracted. I recall an instance of retrieving two black ducks that if they had not been watched in their flight of about a mile would not have been found. This occurred during an unusually low tide in Revels Island Bay, when much of the bottom was exposed for a couple of hours.

Knowing that under such conditions black ducks were likely to come in considerable numbers to feed in the few places, I built a small blind at the edge of the marsh in the hope that some would pass within range. After a while a pair of black ducks headed in my direction, but dropped to a pile of seaweed nearly a hundred yards away.

Substituting for the cartridges in my gun others containing No. 3 shot, I stood up in the blind. As I expected, the pair arose almost perpendicularly, quacking loudly. I fired at the upper duck and then took a shot at the other.

I saw the birds leave, apparently unscathed. I could not be sure of this, however, and I watched them fly north toward the end of the bay.



A GROUP OF REVELS ISLAND GUIDES IN 1901

Leading simple lives in those days, they continued to honor the ancestral traditions of sturdy honesty in contact with visitors from the outer world. Unfortunately, at the time this picture was taken some of the older men who had grown gray in the service were absent.

When they were so far away that they looked like two tiny black spots, one of them turned and came back along the opposite shore. Its high and undeviating flight suddenly ended; it stopped abruptly and fell straight down with a splash on the surface of the muddy pool, directly in line with a distant stunted cedar.

By its actions I knew that the duck had died in mid-air before it fell. While pulling up my hip boots to go for it, I happened to notice that the surviving duck was returning along the same course as that followed by the first. Within a hundred yards of its dead mate it, too, collapsed and fell with a splash. A few minutes later I made the

trip across the muddy flat and without difficulty found both birds.

Bald eagles were rather common about Revels Island. They seldom harmed the other birds, but one once caused great excitement at the clubhouse. Captain Wickes, then superintendent, was returning to the club through the "swash" channel in a small ducking boat when he saw one of these handsome birds flying overhead within easy gunshot. Thinking it would make a good specimen to mount as a trophy, he fired and dropped it near the boat.

OUR EMBLEMATIC BIRD MAKES A STIR

Picking up the apparently lifeless form, Captain Wickes stowed it between his legs and continued rowing toward the clubhouse. Suddenly one of his legs was gripped by the long talons of the bird, which sank into the flesh, causing great pain.

At such close quarters he could neither shoot the bird nor hit it with an oar. He did what seemed to be the best thing—leaped overboard, hoping to drown his assailant and thus cause it to release a grip that would only enlarge his wounds if he tried to pull the bird away while it was alive. As he came to the surface, he found the eagle had let go its hold and was standing erect on the bow seat of the boat.

No wind was blowing at the time, and the boat continued to drift with the tide toward the clubhouse. The captain swam ashore and limped along after the drifting boat for a quarter of a mile, expressing his feelings meanwhile in violent language.

The boat at length touched the bank at a bend, and the ousted skipper was able to get on board. Seizing one of the small oars, he gave the defiant bird a knockout blow, and it sank to the bottom of the boat, apparently with a broken neck.

On reaching his destination, the captain carried his trophy ashore, and threw it on the porch back of the kitchen.

While binding his bleeding wounds, for a small artery had been opened, he heard loud shrieks from the rear of the kitchen. Hastily tying on a temporary bandage, he hurried back to learn the cause of the uproar. A colored maid, with bare feet, while examining the bird, had given it a kick to turn it over for further inspection. Thereupon the apparently lifeless bird had sunk his talons deep into the calf of her leg. She shrieked and jumped about on one foot until she fell down the back steps to the

ground. Picking up a piece of stove wood, the captain finished the eagle.

There were days in the spring when the migrating shore birds were not in flight, and then I turned my attention to nesting gulls, skimmers, herons, and oyster-catchers, or to such land birds as the osprey, fish crow, flicker, brown thrasher, tree swallow, grackle, and bluebird. Seldom at this season of the year need the camera be laid aside for want of subjects, and thus the period lost by the devotees of hunting, now that spring shooting is necessarily prohibited throughout the country, can be utilized by the true lover of the out-of-doors.

The next to my last trip to the island was made to photograph the robin snipe and the Hudsonian curlew, for it seemed to me as if they were going the way of the wild pigeon and would soon be exterminated.

My last visit to the island was in May, 1923, at which time I was accompanied by Dr. E. W. Nelson, then Chief of the Biological Survey of the United States Department of Agriculture. The purpose of the trip was to check up on the reported increase of shore birds as a result of their protection under the Migratory Bird Law.

The launch had no sooner put out from the little town of Wachapreague, on the mainland side of Wachapreague Inlet, north of Parramore Island, than Hudsonian curlews began springing up on all sides, and we observed nearly a thousand on the six-mile trip. Yet this bird had nearly become extinct ten years before.

THE FEDERAL LAW HELPS

In our several days on the marshes and mud flats we found that the protection given the birds by the Federal law had resulted in an increase in the numbers of most of the shore birds, including the willet, the black-breasted and the smaller plovers, the knot or robin-snipe, dowitcher, calico-backs, or turnstones, and many varieties of sandpipers. The yellow-legs, however, were scarce, since an open season still permitted shooting of this species.

Subsequently the Advisory Board, of which I was a member, a committee of game commissioners and sportsmen appointed to offer recommendations for drafting regulations relative to the administration of the Migratory Bird Law, advised that the season be closed on yellow-legs. This suggestion was adopted by the Department of Agriculture in 1927.

CHAPTER VI — PART I

Wild Fowl on Currituck Sound of North Carolina

I HEARD so much years ago about the great gatherings of wild fowl in Currituck Sound that I longed to go there. The opportunity came through an invitation from W. Cameron Forbes, president of the Swan Island Club, to Dr. E. W. Nelson and me, suggesting that we might find that location a good one in which to study and photograph the assembled waterfowl.

On the evening of January 3, 1922, we left Washington on the boat for Norfolk on our way to the Currituck. The heaviest freeze of the winter occurred just at that time, the temperature dropping to 12 degrees Fahrenheit. During the first 20 miles the steamer had to break its way through the thin ice that extended from shore to shore on the Potomac River, and although this offered little obstruction to the steel hull of the large boat, we became concerned regarding the conditions that we might find at our destination.

Although the ice in the river delayed our arrival at Norfolk the next morning, we were in time to catch a little spur-line train for the village of Munden, on the western shore of the Sound, where the launch from the Swan Island Club was to meet us.

ICE LOCKED THE WAY

When we arrived at Munden we saw from the little dock a broad sheet of ice extending far offshore and no sign of the launch. A heavier launch from Monkey Island had just arrived, however, and the captain told us that he had experienced much difficulty in working his way through the ice and that he was certain that the lighter-draft launch from Swan Island would be unable to get through.

Because of these circumstances it was necessary for Doctor Nelson to return to Washington; the time he could give to this trip was definitely limited. I decided to remain, hoping that I might be able to get to the haunts of the birds.

As I sat on the dock in a somewhat disconsolate mood, talking over the weather prospects with some old fishermen, a powerful fishing tug forced its way in and tied up. The captain assured me that he could take me close to shore in front of the club so that I could land in a flat-bottomed boat.

This plan worked out successfully. The tug broke its way through the ice to within about 500 yards of the shore, and I slid ashore in a skiff pushed out on top of the ice. I was soon seated in the comfortable clubhouse, where the superintendent made me welcome.

Aside from the superintendent, I found the club deserted, for at the prospect of a freeze the members had hurriedly departed fearing that they might be marooned.

AT THE SWAN ISLAND CLUB

The Swan Island clubhouse was a long rambling building standing within a few yards of the water. A large window on one side of the living room overlooked the water and the wild fowl that gathered there except on the rare occasions when the bay was ice-bound. The part of the bay directly in front of the clubhouse has long been a favorite resort for wild geese and swans as well as for numerous species of ducks.

By a friendly understanding between the club members and the residents of the region no shooting was done within a quarter of a mile of the house. The birds as usual soon made free use of the sanctuary, and from the windows at the club one could study them in great detail. Almost immediately after my arrival my attention was attracted to several Wilson's snipe that were feeding with the utmost unconcern on the shore within a few yards of the living-room windows.

Late in the afternoon the ice broke, and a lane of open water appeared a little north of the house. Several hundred whistling swans soon gathered there and patiently awaited the disappearance of the ice so that their feeding places in marshes and bays would be unlocked. Realizing that they were not hunted by the gunners who created havoc among the other denizens of these waters, the swans had become unsuspicious.

Among the club decoys were half a dozen well-fashioned wooden swans, made much larger than the actual birds in order that they might be visible at a greater distance. With the assistance of a club attendant, I placed two of these decoys a few feet from shore opposite the flock of swans in the open lead. In a small blind built a short



EXCITED CURIOSITY BRINGS THEM SHOREWARD

This family of swans, the white parents and five grayish young, are examining some wooden decoys anchored a little farther inshore, and their expressive attitudes indicate their mental disturbance over the strange figures they see. The two pure white old birds, being wary of strange things, keep a little more aloof than the less experienced young.

distance back from the shore I remained concealed for several hours.

Although no swans came within photographic range, I passed my time profitably in studying through my field glasses a fine species that I had previously known only from books and hearsay. While I was in the blind, a blue heron stalked calmly about in the shallow water near at hand, apparently feeling secure in the presence of the two overgrown images of such usually watchful neighbors.

When I returned to the clubhouse, the superintendent, who had been watching my efforts to photograph the swans, expressed the opinion that one reason for my lack of success was my location back of a barren sand beach. The two decoys apparently had been unable to overcome the lack of attraction of water that contained no growth of food plants.

Next morning we built a blind in front of a slightly submerged sand bar south of the house, where Canada geese were awaiting the melting of the ice on their feeding places just as the swans had been doing the day before. From the concealment afforded by this blind I obtained a good series of Canada-geese pictures. I returned to Washington the next day, convinced that I must become better acquainted with the Currituck waters.

The superintendent of the Swan Island Club told me that when the first thin ice of this cold period had formed and put a stop to the wild-fowl shooting, one member had turned his attention to fish crows. With the

aid of wooden crow decoys and a crow call he had killed more than three dozen of these harmful birds. Wild-fowl hunters in general along the Atlantic coast might well follow his example and help destroy these black robbers.

Not long after I had been landed over the thin ice at Swan Island, two guides arrived from the main shore. They reported that they had experienced much difficulty in getting through the ice on the bay. On their way across they had noticed the body of an animal lying on the smooth surface. It had proved to be a dead wildcat or bobcat, and they had brought it with them.

A WILDCAT PERISHES FROM EXPOSURE

Although we examined it carefully, we could find no sign of injury. We were forced to the conclusion that for some reason it had entered the water, perhaps to escape dogs, and, surrounded by the newly formed ice, had died from exposure before it could reach shore (see illustration, page 102).

Its northern cousin, the Canada lynx, lives near the tree limit in Alaska and Canada, where the winter temperatures sometimes go down as low as 70 degrees below zero. Bobcats in some parts of their range in the United States can withstand very cold weather.

It is a fact not generally known that in parts of their range, at least, all the American cats, including the mountain lion and the lynx, are good swimmers, and take to the water rather freely when occasion arises. When in well-fed and healthy condition

many mammals and birds can survive severe cold if they can find their accustomed shelter when not actually in action. Most species from a permanently warm region, however, suffer much and often die when subjected to prolonged cold. Such is known to have been the case with Mexican bob-whites introduced into some northern States.

Desiring to see Currituck Sound under favorable weather conditions, I made arrangements for another trip there the following year, in company with Dr. Frank M. Chapman. We left Washington on January 9, 1923, and proceeded to Monkey Island, in the northern part of the sound. There we were joined by the Federal game warden of the district, who was to take us with him on an official tour of inspection as far as Narrows Island, the home of the Narrows Island Club.

In the course of our passage down the sound in the warden's boat we observed several parties in motor boats hunting ducks. The warden approached each boat and warned the occupants that hunting migratory wild fowl from motor boats was illegal. He told them a repetition of the offense would mean arrest, appearance before the Federal court, and a heavy fine or imprisonment. The information spread rapidly and produced good results for that season at least.

AN EAGLE CATCHES A COOT

In a bay close by our quarters on Monkey Island was a large flock of coots, locally called "blue peters." Suddenly a bald eagle appeared from out the sky and headed for the coots. They exhibited great consternation as the eagle hovered over one end of the flock and then dropped down to within a few feet of the water.

Although not skilled in submerging, the coots dived out of sight. The eagle, thus foiled, mounted and again descended as the birds came to the surface. Again it drove them down. These maneuvers were repeated several times, but the eagle made no serious attempt to capture any of the birds.

After we had watched the birds for about five minutes we were called to lunch, and asked one of the guides to watch the eagle while we were away. The eagle maneuvered for a few minutes longer, then swooped and without difficulty seized one of the exhausted birds. When we returned, the marauder was seated on a channel post eating its victim.

A fish crow, flying by the busy eagle, saw a chance for a meal. It audaciously flew in behind and, beneath the eagle's tail, pulled away some of the remains of the coot. Apparently eagles do not "eat crow," for they might easily capture these slowly flying birds when they are crossing the waters of a wide bay.

Another odd sight that interested Chapman and me was a greater snow goose feeding with some tame white geese near the clubhouse. One winter the bird had noticed that regular rations were served to the tame geese, and it had deserted its fellows and joined them.

A SNOW GOOSE JOINS NEW ASSOCIATES

In the spring it went North with others of its kind to carry on its family duties, close to the Arctic circle, and no one expected to see it again. On the approach of cold weather, however, it reappeared, and parted from its kin to join again its adopted mates.

One day I threw out a handful of corn as bait and obtained a picture of this wise bird (see page 104, lower). Its alertness, both on foot and on the wing, was notable, and it gathered a large share of the grain while the tame geese were waddling about wholly unable to compete with their more active guest. The noise made by the focal-plane shutter caused the interloper to take wing in alarm. It did not return before I departed, apparently fearing the camera and its long tube of brass.

From Narrows Island Doctor Chapman returned to New York, but I remained for a few days' further work among the birds. Both of us enjoyed this expedition, which yielded many good photographs for my collection. My interest in this wonderful wintering place for wild fowl was so great that the following fall I became a member of the Narrows Island Club. The motion for my election was made by my long-cherished friend, Dr. George Bird Grinnell, dean of American sportsmen, and at that time president of the club.

The great flight of ducks, geese, swans, and other wild fowl that since time immemorial has swept down each fall through eastern North America from the northern breeding places occupies mainly two great wintering grounds. The most extensive of these includes the waters along the Atlantic coast from the head of Chesapeake Bay southward to Core Sound near Beaufort, North Carolina. The center of abundance



A FLOCK OF CANADA GEESE ARRIVES AT CURRITUCK SOUND

There is no more inspiring sight for a lover of wild creatures than the coming of wild geese from their far-northern breeding grounds. The ordered ranks of the flying birds and their clanging cries of greeting to their winter home stir one's pulse in sympathetic response. When migrating, far overhead, these geese usually travel in a wedge-shaped formation, with a leader at the head.



CANADA GEESE REST ON CURRITUCK SOUND

When these wary birds are preening themselves and resting in quiet places, one or another of the flock will raise its head and look about sharply for possible approaching danger.



THEY FIND GOOD HARBOR OPPOSITE THE SWAN ISLAND CLUB

When no shooting is permitted near the clubhouses, geese and ducks soon take advantage of these safety zones. On feeding places, a flock of geese presents an animated sight as the individuals continually up-end to gather food well below the surface.



A SOUTHERN WILDCAT WAS KILLED BY
A COLD NIGHT

When some guides crossed the new ice to the Swan Island Club, they found a wildcat lying dead on a floating cake of ice. Evidently it had perished from exposure (see text, page 98).

is in and about Currituck Sound on the coast of North Carolina. This haven is separated from the ocean on the east by long stretches of sand beaches and sand dunes and therefore well protected from violent storms.

Currituck Sound enters the eastern end of Albemarle Sound, which extends westward for 60 miles, and these combined waters connect with Pamlico Sound, which, with a width of 30 miles, borders the coast for nearly 100 miles, and joins Core Sound, the southern limit of the best ducking waters on the Atlantic coast.

The great extent of Pamlico Sound, combined with a favorable depth of water, makes it a congenial wintering haunt for large numbers of redheads, ringnecks, scaups, scoters, golden-eyes, buffleheads, and old

squaws. From Back Bay, in Virginia, to Core Sound, North Carolina, the inner, or western shore line, has an extent of some 300 miles, a distance somewhat longer than the outer, or eastern, coast, for the several shorelines of Albemarle Sound are computed as a part of the inner lines. No other place on the American continent affords such a favorable winter home for our wild fowl, and here at an early day should be established large wild-fowl refuges that would be havens of security.

The birds that winter in this area come from two sources: (1) the great region of shallow lakes and ponds on the plains of Alberta and the neighboring provinces, the breeding grounds of central Canada, and (2) the breeding grounds of eastern Canada, including the Hudson Bay region, Labrador, and the neighboring Arctic islands to the northward. The birds that move down the Atlantic coast linger about Long Island Sound and Barnegat Bay until the coming of severe weather forces them southward, when they seek their accustomed winter quarters in these great sounds.

THE MISSISSIPPI IS A "FLYWAY"

The other great wintering ground includes the coastal and tidal marshes of Louisiana and Texas. The birds wintering there reach the Gulf of Mexico by following the broad flyway down the Mississippi Valley, in which they linger at favorable feeding grounds until driven South by the near approach of winter.

Since the eastern coast of Georgia and Florida has few shallow fresh-water bays and little wild-fowl food, these States separate almost completely the group of migrants that winter along the Atlantic coast from those that winter on the Gulf. A number of the species of geese and the swans so abundant in the Currituck Sound region are usually not found in such numbers farther south than the Carolinas.

Currituck Sound is an ideal home for wild fowl during the winter months. It is shallow and is surrounded by marshes, bays, and ponds of almost entirely fresh water, in which various kinds of excellent food plants for wild fowl abound. Fish, shellfish, and crustaceans favored as food by some of the species of waterfowl are also plentiful.

On the deeper and more open waters of the sound, therefore, thousands of canvasbacks congregate; and redheads, scaups, and golden-eyes are numerous. In the shal-

low bays and connecting ponds are great numbers of marsh ducks, such as the black duck, mallard, widgeon, pintail, and teal, which usually assemble in smaller flocks than the species that frequent deep water. Once, however, I saw a flight of pintails that probably contained more than 5,000 birds.

The geese are extraordinarily abundant in these waters. I have seen more of them in a single season on Currituck Sound than during a dozen years' visits to Revels Island, on the Eastern Shore of Virginia, where geese were not considered to be scarce.

THE WHISTLING SWAN

The whistling swan is to me the most interesting bird on the Currituck. Although local estimates of the numbers of these birds vary from 50,000 to nearly 100,000, the actual winter population probably does not exceed 20,000 or 25,000. Fifteen or 20 years ago the swans in this region were becoming dangerously reduced in numbers through overshooting, but protection has brought them back.

Although the whistling swan is found also on Chesapeake Bay and other neighboring waters, the main winter concentration is on Currituck Sound. I was astonished to learn from Doctor Chapman, who ranks among the leaders in American ornithology and has traveled extensively over this continent, that before this trip to the Currituck he had never seen one of these great birds in their haunts. This well indicates how local is the distribution of the species in its winter quarters as well as over its general range.

The increase in the numbers of swans that has resulted from the rigid protection afforded them has given rise to a troublesome problem. The concentration of these birds on waters occupied by great numbers of ducks and geese naturally decreases the food supply for all. Swans have the habit of pulling up the water plants, to eat the stems and some of the roots, and in places they destroy temporarily the available food crop over areas of considerable extent. Many sportsmen for this reason object to the presence of these birds on the ducking grounds and have urged that an open season be allowed in order that their numbers may be reduced.

A population even as low as 20,000 swans means approximately 8,000 breeding pairs. Since each pair produces from two to four young, it seems certain that, non-breeding birds and every form of casualty being taken

into account, the young swans or cygnets must number several thousands annually.

Since a swan weighs from 12 to 16 pounds, the amount of food it consumes is considerable. The damage to the food supply is only temporary, however, for each summer there is a renewal of the growth on the feeding areas. Few sportsmen would care to shoot more than one swan a season, but the natives are very fond of them, especially the young ones, and under present conditions their increase is doubtless kept in check to some extent by illegal night shooting. Those who go forth to kill swans at night may be tempted also to shoot into flocks of geese and ducks if they should happen to come upon them.

Because of Federal regulations, the perpetuation of the whistling swan seems to be assured. Anyone who has witnessed the great white bands flying up and down the sound, or has seen the birds in large flocks in the quiet bays and has heard their clear, flutelike notes, often during the darkness of the night, will be ever ready to defend them.

Swans apparently mate for life, and the young during their first winter accompany their parents; so that whatever may be the number of birds that are congregated in one flock, the family is the unit. When the birds are on the water it is not difficult to pick out the small divisions based on kinship. The swans feed in the morning and late in the afternoon, and often at night if the weather is favorable. From 10 o'clock in the morning until 3 in the afternoon they can be seen drifting about in family groups, most of them sound asleep, with heads and long necks folded on their backs (see illustration, page 110).

DUCKS OF THE MARSHES AND OF DEEP WATERS

Ducks are divided roughly by their feeding habits into two large groups, each of which contains many species. In one group are the marsh ducks, which frequent the shallow waters in which reeds, rushes, wild rice, and other vegetation grow abundantly. Among these ducks, the best known are the mallard, black duck, pintail, widgeon, gadwall, and the several teals. The other group includes the deep-water ducks, species that commonly procure their food by diving. The most common of these, found in both fresh and brackish waters, are the canvasbacks, redheads, and scaups. With these may be included the heavy-bodied sea



THE SNOW GOOSE IS EVER WATCHFUL OF THE CAMERA

Wary wanderers of the heavens are these magnificent flyers that present a charming picture in Currituck marshes.



THE WILD CAME TO DINE WITH THE DOMESTICATED

In the background is a snow goose which two winters in succession fed with the three tame geese (foreground) on Monkey Island, Currituck marshes (see text, page 99). These geese breed on Canadian Arctic islands and winter largely in Chesapeake Bay and the Currituck Sound region.

ducks, such as the eiders and the scoters, but the random notes here given refer little to them.

It is difficult to form any definite idea concerning the relative numbers of the marsh and the deep-water ducks. Marsh ducks pass so much of their time under cover of dense growths of vegetation that their numbers are indicated only when they mass to fly from one feeding ground to another, to migrate, or to escape from persecution by gunners. Deep-water ducks, on the other hand, appear daily in flocks on their feeding or resting places in open water offshore, so that the numbers occurring in a locality are much more readily estimated.

FLIGHT OF DUCKS

There are marked differences in flight between these groups of birds. Mallards, black ducks, pintails, and teals have proportionately longer and more pointed wings and proportionately slenderer bodies and are thus able to spring almost perpendicularly into the air; furthermore, many of the marsh-loving ducks can turn and twist in flight in a manner quite beyond the powers of others.

The deep-water ducks have proportionately shorter and more rounded wings and shorter and heavier bodies. Because of these physical characteristics they have greater difficulty in taking wing. They rise gradually, and perforce skim along the surface for some distance as they gain momentum.

The members of the two groups show similar differences in their methods of alighting. Gunners find the quick, erratic movements of teals, pintails, and black ducks on the wing a better test of marksmanship than is usually afforded by the steadier, less deviating flight of the deep-water ducks. A butter-ball, or golden-eye, however, when hurrying along, may call for the best shooting to bring it down.

Marsh ducks can usually drop abruptly to land where they desire in a way to fill any aviator with envy. Once, however, I saw an amusing miscalculation on the part of a dusky duck. I was ambushed in a blind near Sandusky Bay on the edge of a small grain-baited pool scarcely 10 yards wide, surrounded by a heavy growth of tall reeds. The bird was coming high overhead directly toward the spot.

When nearly above the pool, it dropped almost perpendicularly about 200 feet, and as it came near the surface of the water it

changed its descent into a landing curve, vigorously back-stroking with its wings to check its speed. Its momentum was too great, however, and its impetus carried it with a loud rushing noise out of sight far into the reeds. A few moments later the discomfited bird came waddling back through the vegetation to the edge of the water.

A blind in a good marsh will afford the sportsmen a far more interesting variety of birds than will a shooting stand for deep-water ducks. In shooting deep-water ducks one usually obtains the best results from a battery, a floating blind, or a blind on the end of a long point separating two bays. The movements of these birds are largely governed by the weather, however, and one may sometimes sit in a blind for hours without firing a shot.

The plumages of the two groups of ducks display marked differences in color patterns. The colors of the marsh-frequenting species are much more broken and blend into a whole that fits readily into a background of marsh vegetation, whereas the deep-water ducks are characterized by having the colors distributed in strongly marked blocks or areas. In both groups the males are more strongly and handsomely marked than the smaller females.

The species of both groups of ducks have the power to deflate their bodies when wounded or even when alarmed, and can remain for long periods submerged with only the tops of their heads, their eyes, and the tops of their bills exposed. At such times they are very cunning in taking advantage of water plants or small floating objects to complete their camouflage.

KEEN SIGHT OF MARSH DUCKS

I am convinced that marsh ducks have a much keener sense of vision than the deep-water species. In their winter quarters these ducks have become even more closely familiar with the details of the landscape they frequent than man becomes with the streets he uses day by day in his home town. For this reason it is necessary that a shooting blind be constructed of material that blends closely with the background and that the occupant of this shelter wear clothing of the same generally inconspicuous hues.

It is well known that a hat or cap of an inharmonious color worn in the blind or any movements of the wearer will often alarm birds at a surprising distance. As they circle

overhead, marsh ducks may be observed turning their heads at slight angles to get better views of the country below them. When they discover the enemy awaiting in the blind, the loud quacks of alarm that mallards sometimes utter are disconcerting to the sportsman.

In contrast to this alertness of the marsh ducks any hunter may recall the heedless manner in which canvasbacks, bluebills, and other deep-water ducks come sweeping in to decoys, giving little or no attention to the blind or its occupant even though the hunter may be imperfectly concealed.

DIALECTS OF THE MARSHES

Some species of ducks, especially those of the ocean, are usually silent or have low notes; some have loud, vibrant, and penetrating voices; and some give expression to their feelings in clear and musical tones. Often in the evening I have lingered on the border of a Virginia or Carolina shore marsh, or in the marshes of Louisiana, and listened to the gentle gabble of the different waterfowl as they fed in happy serenity without a thought of the deadly gun.

It sometimes was difficult for me to determine the identity of the birds, for they seemed to talk a language not used in the daytime. When wild fowl are migrating, consorting on the nesting grounds, or visiting feeding places by day, the different kinds may usually be determined by their notes, for each species has its characteristic language.

The black duck and the mallard, when alarmed, utter loud, resonant quacks, the voice of the female being the more strident; but when the birds are feeding amid peaceful surroundings, the notes are a softly modulated gabble. The gadwall, common in the interior but rare on the Atlantic coast, expresses its emotions by a quack that is higher in pitch but has less volume than the note of the mallard.

Both the European and the American widgeon utter a sort of *whew, whew*, while feeding or swimming, but are usually silent on taking wing. The green-winged teal is a noisier bird than the blue-winged, the male uttering a short, soft whistle and the female a quack that is high-pitched and often repeated. The shoveler, more common in the Mississippi Valley than on the Atlantic coast, is generally silent, but in the breeding season it is said to have a note like *took! took!*

The pintail, while going about its daytime activities, is usually silent, but at night "the hoarse muffled quack of the female, and the mellow whistle of the drake" can be singled out from among the voices of other ducks. During the mating season the drake has a low soft note, especially when performing its curious courting antics in the presence of its prospective mate.

Wood ducks, when alarmed in their woodland ponds or streams, spring from the water with a plaintive whistled *oo-eeek*. This unsuspicious and most ornate of our woodland swamp ducks became greatly reduced in numbers until continuous legal protection throughout the country helped to increase its numbers in many of its haunts that had become almost depopulated.

The open-water, or diving, ducks are distinguished from those of the marsh by a broad lobe, or web, on the hind toe, a feature probably correlated with their habit of diving. They procure their food generally in deep water. This class may be further divided into those such as the canvasback and scaups that frequent the large lakes or the rivers and bays of fresh or brackish waters, and those such as the eiders, scoters, and old squaws that habitually occupy the ocean or the salt water estuaries.

VOICES OF THE DEEP

The ducks in the latter group use their wings as well as their feet in diving, and the several species are able to reach depths varying from 50 to more than 100 feet. The marsh ducks, on the other hand, have the "tip-up" habit of feeding and feed in the shallows with half of their bodies out of water.

With the exception of the old squaws, the deep-water ducks have notes not so loud or resonant as those of the marsh-dwelling species, and some that frequent the open sea seem to be voiceless. The canvasback, generally regarded in the East as the king of ducks, is found in large lakes or in shallow tidal waters. Often when I have had flocks of them under observation I have heard a harsh grunting note, which I attributed to the drake, for the female has a well-recognized quack and is reported when alarmed to utter a screaming *curr-row*.

The redhead I have also seen frequently on large bodies of open water and on the seacoast, but I have not heard its notes. The scaups, both the greater and the lesser, utter a purring note when excited, or when



LIKE A MASS OF TINY CLOUDS THEY RACE ON THE WINDS

Huge flocks of swans, geese, and ducks, sometimes numbering many thousands of birds, darken the sky over Currituck Sound. Above is shown a great flight of pintails opposite Swan Island.



PINTAIL DUCKS FEED IN CURRITUCK SOUND

Whenever a dainty morsel is located, down goes the bird's head and up comes its tail. The water presents a lively scene when these migrants arrive.



WHISTLING SWANS ARE MASTER AVIATORS

Tens of thousands of these noble birds winter in the region from Chesapeake Bay to Currituck and Albemarle sounds. Since they have been protected under the Migratory Bird Treaty Act, they have greatly increased in numbers. As they rise against the wind, they aid the launching into the air by vigorous use of their broadly webbed feet, as indicated by the spray shown in the photograph.



THE CAMERA REVEALS FLIGHT ATTITUDES OF WILD DUCKS

This series of individual pictures, taken from group views photographed on Currituck Sound, gives a varied presentation of wing motions of these marsh dwellers rising from the water. The human eye cannot register positions which are held for only a small fraction of a second.



WHISTLING SWANS ENJOY PEACE AND QUIET

The typical swan family passes the winter in friendly companionship on Currituck Sound. The two pure-white parents and the grayer young may be distinguished readily. One of the young in this group is sleeping in a characteristic pose, its neck folded back against the body and its head lying on the middle of its back, between the bases of the wings.

calling to their mates; but the note with which I am most familiar is a short rasping one that sounds like the word *scaup*, from which they have received one of their names. They are more generally known as bluebills, broadbills, blackheads, or raft ducks.

The American golden-eye, sometimes called the whistler from the sound made by its wings in flight, is a famous deep-water diver. When feeding alone or in small groups, members of this species are more watchful than are most of the deep-water ducks, which enjoy a fancied security when massed in large flocks. The note of the male golden-eye consists of a single *peep*, and that of the female of a sharp *cur-r-rew*.

The eiders and the several species of scoters, although the scoters nest mainly near fresh water, are typical sea ducks during their migration, ranging southward in winter along the eastern coast to Long Island Sound and the Carolinas, and on the western coast to Lower California. I have observed many of these heavy-bodied, sturdy ducks along the coasts of Alaska and Newfoundland in the summer and at the mouth of Chesapeake Bay in the winter.

Although at times they gather in great flocks, they often feed more or less alone, dotting the bays here and there with their dark forms, and ever intent on seeking on the sea bottom mollusks and crustaceans, a diet that renders their flesh strong and unpalatable. With the exception of man, they have few enemies in their winter home. I have never heard an eider or a scoter utter a sound; yet eiders, at least, are known to keep up a low guttural gabbling when in flocks about rocky points and islets.

The one duck of the ocean and salt-water bays of the North that has a loud and vibrant note is the old squaw. This is the only member of the duck family known to me that indulges in a vocal chorus and seems to enjoy it as much as does the springtime songster his utterances in the treetops. The notes are clear, musical, and penetrating, sounding like *ou-ou-wein*, or sometimes *south, south, southerly*, from which latter note they are frequently called south-southerlys.

At times, when half a dozen of these birds cry in chorus, the sound resembles the musical baying of distant hounds hot on the trail



A WHISTLING SWAN EXAMINES SOME DECOYS

This youngster swan has come in to visit some wooden effigies of his kind. Its dark-gray head and the dull white of the rest of its plumage indicate that it is a bird hatched the previous summer. It appeared to resent such clumsy images and swam up close to each one, pecking vigorously at its head.

of their quarry. All the tribes of natives in the North, where this duck is especially conspicuous during its migrations, have given to it names suggested by its loud ringing springtime song.

In the interpretation of duck talk, as in the speech of man, intonation plays an important part, for a word may have quite different meanings according to the stress. A black duck or a mallard, for instance, when suddenly flushed from the reeds, will utter a harsh quack, clearly expressive of alarm; whereas another quack from such a duck flying over the marshes and looking for some of its kin is interrogative in character, as if the bird were saying, "Where are you?" In response to this may come a friendly quack from below, indicating the whereabouts of would-be companions and meaning, perhaps, "The water's fine, come on in."

Here is a fertile field of study for the bird linguist, who by careful research may more fully understand the thoughts and actions of some of our most numerous and interesting forms of wild life.

In the Currituck region, where I have

photographed many ducks, geese, and swans, there are three rest days weekly—Wednesday, Saturday, and Sunday—on which no shooting is permitted, and the waterfowl are thus given a chance to feed and rest.

This wise provision of the law naturally invites the use of the camera, and many sportsmen now occupy these otherwise idle days by taking pictures of wild fowl swimming about or speeding over the decoys, perhaps at 50 miles an hour.

In this kind of sport the customary hardships of wild-fowl shooting are largely avoided, for instead of arising at daybreak, the camera hunter may not go forth until the sun is well up, and should return early in the afternoon, before the time when the fading light makes rapid exposures impossible. If it is raining or blowing a gale, he may stay under a roof, awaiting better weather.

Satisfactory pictures of birds on the wing depend upon careful preparation and accurate handling of the camera. At first it may seem more difficult than wing-shooting, but in a short time practice overcomes the



MALE GREATER SCAUPS

A cameraman may shoot as many sitting ducks as he fancies without being a pot-hunter.



REDHEADS, MALE AND FEMALE

This picture and the others on this and the opposite page were taken on Currituck Sound.



MALLARDS, MALE AND FEMALE

The lord of the family precedes his consort as they swim along Currituck Sound.

principal troubles, and then the photographer can obtain greater numbers of wild fowl on his plates in a single hour than a crack shot could kill in several days.

The methods of locating the blind and setting out the decoys are the same as for shooting, except that there must be a small, low opening in the front part of the blind, where reeds or other obstructions are not permitted to interfere with a semicircular swing of the camera.

Of course, the greatest difficulty in taking pictures of flying birds is not in getting the birds on the negative, but in getting them in sharp focus. A badly focused bird is to the camera hunter as great a disappointment as a wounded one that escapes is to the fowler.

In a lane, between two sets of decoys, I place five especially marked decoys 10 feet apart, the nearest being 30 feet from the blind. These fixed distances should be shown on a temporary camera scale. It will be found difficult to release the shutter by the ascending mirror in time to photograph flying birds, if the graflex system is used, for the process involves much guesswork. By setting the shutter at time, however, one can dispense with the use of the mirror and operate the focal plane shutter successfully by a quick pressure on the upper catch.

HOW TO PHOTOGRAPH BIRDS IN FLIGHT

The shutter should be set at from 1/300 to 1/1000 of a second, as the quality of the light and the speed of the birds require. When a flock is seen approaching, a long lever on the side of the camera connected with the focusing disk is thrown to a point that brings the birds in focus, according to which one of the five decoys they happen to be nearest.

Whether the photograph is taken as the ducks are coming straight in, circling, dropping, or rising, it requires quick thinking and equally quick manipulation of the focusing apparatus and the shutter—exactly the same quickness of mind and body that is required in successful wing-shooting. The person hunting, however, has a distinct advantage with the camera, for if he misses or bungles, the birds are very likely to return to the silent blind.

Most of my pictures of swans were taken from a launch coming down wind toward feeding or resting birds; when they arose, quartering toward the boat, I could get satisfactory results, even at 100 yards,

through the use of a long-focus lens. Several times I put out goose decoys painted white. The older swans eyed them with contempt; but sometimes cygnets, or young of the year, would swim in and at times even attack these poor counterfeits.

Canada geese rarely came to the baited blinds until after sunset, when shooting is forbidden. Apparently they soon became aware of this prohibition, and kept an eye on the declining orb. In 1927 a local regulation prohibited shooting after 4 o'clock in the afternoon, and the geese promptly advanced their feeding schedule. As a result of these circumstances I could enter the blind while there was yet sufficient light to get many pictures, much to the envy of my fellow hunters when they heard me tell that large flocks of geese swam back and forth in front of the blind paying no attention to the clicking camera.

GENEROUS LANDLORD NEEDED FOR OUR WILD FOWL

In recent years our wild fowl have been given increased protection. The outlawing of the market hunter, the prohibition of spring shooting, the marked reduction in the daily bag limit, and a shorter shooting season have all contributed toward the ultimate goal of protecting wild fowl from unreasonable inroads of the gun. It is now necessary, however, if desirable numbers of ducks and geese are to be maintained, that they have a better and more dependable food supply. To protect a bird from destructive shooting and then permit it to starve is poor policy.

It is easy enough in these days to pass game laws and create a demand for game refuges, but unless there is ample food on the reservations, the birds must leave them for maintenance elsewhere. This means peril from the gun or a visit to unsuitable sections in which they may come in contact with the death-dealing, mud-carried botulinus, which has already caused the death of many millions of ducks and other species of wild fowl.

Many well-meaning persons seem to think that because our wild fowl have markedly decreased in numbers during the past century, there must be ample feeding grounds for those that remain. Unfortunately, this is not the case, particularly in the winter homes of the ducks. There are now many millions of acres of marshland, shallow bays, and estuaries in which the aquatic food has



RING-NECK, MALE AND FEMALE

The camera caught them sitting on the quiet waters of Currituck Sound.



FEMALE WIDGEONS

Currituck Sound is a mecca for many interesting species of waterfowl.



BLACK DUCKS

Because of their color they stand out among the swimmers on Currituck Sound.



"ROCKED IN THE CRADLE OF THE DEEP"

This swan is peacefully asleep on a quiet, bright day, its long neck folded over its back.



ITS APPETITE BETRAYED IT

This young swan, suffering from lead poisoning and unable to fly, was caught near shore. The ailment comes from shot pellets picked up on the bottom and retained in the gizzard until destroyed by attrition.

been destroyed, sometimes by overfeeding on the part of the wild fowl, and sometimes by agencies for which man is responsible, such as oil or chemical pollution, the invasion of fresh waters through canals connected with tidal waters, the use for oyster culture of waters formerly monopolized by waterfowl, or the daily activities of fishermen with their nets and gasoline launches.

These difficulties are purely physical. Then, too, for several reasons there seems

to be a tendency on the part of wild fowl to migrate in larger flocks and to concentrate in waters having an insufficient food supply throughout the winter. In Currituck Sound I found that two-thirds of the so-called public waters were barren of plant food, although some of the diving ducks still had a scanty supply of crustaceans and other small animal life.

In this region thousands of bushels of corn and other grain scattered about on club properties contributed much toward preventing the starvation or the dispersal of the wild fowl throughout the waters of the sound.

The creation of large winter wild-fowl refuges has resulted in many birds being attracted to them at the beginning of the hunting season. These wild fowl soon destroy the bulk of the available food, and when they are thus fattened, they furnish to hunters in adjacent areas victims that are in prime condition. I once

noted a comparatively large fresh-water lake in the Louisiana marshes that at the beginning of the hunting season was so covered with the banana plant that the surface of the water was hidden. After the arrival of the canvasback by the tens of thousands this plant soon completely disappeared. Fortunately, the roots were not destroyed, and the next season's crop would be equally abundant.

What becomes of the ducks when they leave a protected area? This query may be



THEY HAVE THEIR UPS AND DOWNS

Unlike marsh ducks, which can spring into the air vertically or drop straight down, the scaups and other deep-water species rise gradually from the surface or descend gradually.

asked regarding every wild-fowl refuge created up to the present time. The answer implies that there must be a systematic planting of duck food in the immense barren areas before the problem of properly maintaining our wild fowl can be solved.

The experts of the Bureau of Biological Survey of the United States Department of Agriculture have listed the more important duck-food plants suitable to the climate or the character of the waters in many sections. That Bureau, however, does not have funds to collect and distribute these plants. In the last decade the Federal Government has spent many millions of dollars in reforesting areas, in helping the agriculturists in the selection and culture of their crops, and in

aiding reclamation and irrigation projects. Why should not the Federal Government also provide funds each year to maintain an adequate growth of desirable wild-fowl plants in its growing series of great Federal wild-life refuges or in waters open to the public?

SHOOTING CLUBS ALONG THE ATLANTIC COAST

From Long Island to the Florida peninsula are many shooting-club properties of considerable acreage, some of which have been occupied for more than 75 years. This coastal area, with its marshes and wooded islands, has long been a favored region for hunting wild fowl in winter and for com-



HIS BAG FROM THE BLIND WAS GOOD

Such shelters for canvas-back shooting are made of the common kind of rushes growing in the marshes (*Juncus roemerianus*).

mercial fishing during most of the year. Membership in many of the clubs is limited to a few dozen persons, made up of groups of friends from some section of the country. As the older members retire, it is natural that their successors should be their younger relatives or intimates, and thus the close associations and friendships of their home region are continued.

A history of the more permanent hunting clubs throughout the country would be interesting, for it would present a picture of one phase of the social life of our sportsmen that is more representative in its character than any in most other gatherings. These close contacts for days at a time, year after year, have brought together those having common interests in sports under conditions of



A SUDDEN ALARM CAUSES COMMOTION

Swans have much difficulty in rising from the surface, their long wings beating the air with heavy strokes, while their broadly webbed feet, helping to give the body the necessary impetus, strike the water and dash it into clouds of spray.



CURRITUCK SOUND OFFERS FOOD FOR THOUSANDS

Mallards and black ducks gather on common feeding places in shallow water, where they are often joined by pintails and coots.



ALARM!

The contrast of the flight of mallards and black ducks with that of the coots when startled is well shown in this photograph.



MIXED COMPANY

Note the stately male pintail in the center. Beyond is a black duck, in front of it are two female pintails, and in foreground is a mudhen.

relaxation from business responsibilities that tend to create a congenial atmosphere.

I have met several sportsmen more than 80 years of age who, bereft of their contemporaries, have substituted the companionship of those of later generations at the club at a time of life when it is difficult to form such friendships in other places.

CLUBS ABOUT CURRITUCK SOUND

A membership in several clubs on the Atlantic coast, extending over more than 40 years, has given me an insight into the character and spirit of such organizations.

Currituck Sound is about 35 miles long, and from one to five miles wide. It is an important connecting link of the "inside passage" used by yachts and house boats on their way to and from southern Florida. In addition to this limited traffic are the numerous launches of the local fishermen and those belonging to ducking clubs that occupy different parts of the shooting ground.

The inhabitants of the region, almost to a man, favor club possession, for under State laws the nonresident members cannot own batteries or shoot from either fixed or floating blinds. Local hunters shooting from blinds placed at strategic points between club properties get many marsh ducks and the bulk of the geese and canvasbacks. Moreover, a large number of local citizens are employed as caretakers, guides, and wardens; and local merchants get considerable trade from the clubs.

In addition, the local taxes on clubhouses

and on the adjoining marshes produce income from land that would otherwise be nonproductive. The hunting licenses of club members also mount to a large sum. All this revenue, available for local purposes, would be lost if these lands were not used in this manner. On the larger club properties there are at times as many as ten thousand ducks and geese at once; and, since the clubs often have a very small member-

ship, it is doubtful that one bird out of ten of those wintering there is killed. This means that a large proportion of the birds go north again to breed and return in the fall with an increase.

In other areas it has been found that, when club properties are abandoned on account of restrictive laws or excessive taxation, the wild fowl are either killed or driven away through overhunting. In the case of Currituck Sound and adjoining waters, unlimited shooting would drive the surviving birds elsewhere.

SPORTSMEN AND BIRD CONSERVATION

My extended association with sportsmen and sportsmen's clubs, especially along the Atlantic coast, leads me to put on record here some ideas concerning the relation of sportsmen to bird conservation that I have long had in mind.

The sportsmen whose love of the outdoors leads them to seek out these birds in their remote congregating places, have the privilege of becoming more familiar with them than those lacking such opportunities. Although a strong believer in sane conservation, I have always felt strongly that no reasonable objection can be raised against the taking by sportsmen of a reasonable part of the surplus wild fowl, which, if conditions are right, should come to their wintering grounds each year. It is well known that feeding areas have become so reduced that if the surplus is not reduced each season the accumulation of birds would soon so exceed the available food supply that an appalling

loss by starvation of both surplus and breeding stock would inevitably take place.

Prior to the 18th century the numbers and distribution of wild fowl on this continent were largely regulated by their food supply, which factor rather than predatory enemies, including man, held the species in check. So prolific are these game birds that until the comparatively recent increase in human population and the consequent settlement of the country, the spoliation of the haunts of the wild fowl, and the improvements in guns and methods of travel, the birds were easily able to maintain their numbers.

SPORTSMEN FAVOR CONSERVATION

From the time when it was first noted that wild fowl needed protection from excessive exploitation, intelligent, unselfish, and experienced sportsmen have been the foremost advocates of adequate laws and regulations to safeguard these birds. As individuals and as members of sportsmen's organizations they have been largely responsible for the legislative action that has been so helpful to both game and non-game birds.

Included here with the sportsmen's organizations are the sportsmen's magazines, which have so generally voiced the desires of their supporters. These are facts that can be verified by detailed inquiry into the real history of the enactment of all the most effective wild-life conservation measures.

That day has passed forever in which the intelligent hunter took a false pride in displaying a hundred or more ducks as the result of his skill during a day's hunt. This change in sentiment is evident from the preference of sportsmen's magazines for photographs illustrating living birds to those picturing rumped heaps of dead ones.

The annual task of protecting the country's wild life gives employment to thousands of men and costs millions of dollars, and this fund is derived almost wholly from licenses taken out by hunters. The general public pays very little in taxes toward the enforcement of the law protecting game and other wild life and toward other costs of maintaining them in adequate numbers. Such expenditures are defrayed mainly from the income derived from the sportsmen.

It should be appreciated by the general public, interested especially in the insectivorous and other nongame birds, that the laws for their protection, in nearly every instance, have been passed by the active help



MALE LESSER SCAUPS

Their plain blue bills and light-gray backs, the white bars across their bills and the black middles of their backs distinguish the sex at a glance. The gray body and long sloping top of head and bill characterize the female mallard as does the white around the base of the bill of the female scaup.

of sportsmen, and that to a great extent the funds used for the enforcement of these laws are directly provided by those who take out hunting licenses. Should severely restrictive laws be passed depriving sportsmen of a reasonable opportunity for sport it is believed the resulting decrease of income from licenses would be an almost fatal handicap to effective bird protection.

The sportsman no longer hunts for a record kill. Similarly the bird lover who formerly was so much interested in checking up his lists of species observed in a day's outing is more and more turning to the careful observation of habits. Work by those who may be termed amateurs has added many interesting facts previously unknown to our store of knowledge of bird life. These data have been most acceptable to professional naturalists, who are too few in number and lack the funds to cover adequately such a great field of endeavor.

I have stressed the relationship between the two classes directly interested in bird protection because during recent years there has been a tendency in some directions to decry the sportsman and to ignore the vital part he plays in bird conservation as a whole.

It should be kept in mind that among sportsmen have been many outstanding figures in bird protection, among whom may be mentioned Dr. George Bird Grinnell,



AVIATORS MIGHT WELL STUDY THEM

Black ducks and mallards, unlike some of their cousins, get off the water quickly when alarmed.



ONE IS IN THE AIR, ONE IS TAKING OFF, THE OTHERS ARE MAKING READY

This picture of mallards and black ducks rising from the water should be compared with the one above and that at the bottom of page 117.



THERE IS MIGHTY SPLASHING ON FEEDING GROUNDS

Mallards, black ducks, pintails, and coots mingle in the shallows where food is available.



TAKE-OFFS DIFFER WITH SPECIES

This photograph illustrates some of the attitudes assumed by black ducks and mallards when they are rising from the water in alarm.



A WINTER HAVEN FOR WILD FOWL

On the bays and marshes of Virginia, North Carolina, and Louisiana a great majority of our ducks, geese, and swans pass their winters. The above is a typical view of the first named rising from a Louisiana pond.



BLACK DUCKS TAKE WING

When marsh ducks spring from the water in alarm, their movements are too rapid to register in the human eye. The camera, however, requiring only a very small fraction of a second to make its record, shows the extraordinary attitudes taken as the birds spring into the air. Males and females of black ducks are indistinguishable, contrasting thus with other ducks the male of which has either a more conspicuous plumage, or differs in size or shape from the female.



SWANS MAKE SILHOUETTES AGAINST THE SKY

Among the stirring sights on Currituck Sound is the daily passage of flocks of these birds, which often make the air resound with their melodious notes. In this picture the swans are in full flight.



A PAIR OF CANADA GEESE VISIT CORE SOUND

On a good day many of these fine birds may be seen searching for coarse sand and bits of shell which they swallow to aid in the digestion of their food.



IT IS LUNCHEON TIME IN THE POND NEAR THE CLUBHOUSE

Learning quickly that the waters are safe, many kinds of waterfowl feed unconcernedly near the buildings on Currituck Sound (see text, page 97).

promoter of the original Audubon Society; Senator F. C. Walcott, Dr. John C. Phillips, John B. Burnham, the late Charles Sheldon, and William Dutcher—sportsmen-naturalists who with many others have done splendid work in helping to obtain the enactment of laws for the protection of all harmless birds.

Those whose sentiments are strong for bird protection should recognize the need for a practical consideration of the subject, since conservation, to be properly effective, must be practical.

Today the great problem confronting sportsmen is that of so limiting the annual kill that the breeding stock shall not be jeopardized and the annual surplus decreased. With this responsibility, the gunner must exercise his duty, or suffer if through indifference or selfishness he permits the supply of game to become dangerously reduced. The issue is that of conservation against improvidence, and the sportsmen seem to be awakening to this as never before.

With the growth of cities and the increasing tendency toward urban life it should be obvious that anything leading to a fuller

participation in out-of-door life, amid invigorating and inspiring surroundings, such as those enjoyed by the sportsman, should be fostered as a matter of public policy in the development of the best type of citizenship.

ABUNDANCE OF WILD LIFE IN NORTH CAROLINA

Having given at some length an account of the hosts of wild fowl that frequent the coastal waters of North Carolina each winter, I consider it of interest to refer to the estimate of the various kinds of game taken in that State in the winter of 1927-28. These figures were based on the returns from the hunters who reported. The totals were as follows: Rabbits, 1,555,270; squirrels, 1,263,360; deer, 4,510; raccoons, 28,260; opossums, 324,210; wildcats, 720; muskrats, 34,140; quail, 981,980; wild turkeys, 6,110; ruffed grouse, 500; pheasants, 2,820; snipe, 17,540; rails and coots, 1,220; doves, 170,070; geese, 5,280; ducks, 103,690. In this list no mention is made of black bears, mink, and otter, all of which occur in this State.



A TURKEY BUZZARD TAKES ITS OWN PICTURE

This was one of the raiders that tore the stuffed owl to pieces and ate the kitchen soap at the Hunting Lodge on Cumberland Island (see text, page 131).



A LITTLE GREEN HERON HAS A PRETTY HOME ON CUMBERLAND ISLAND

These birds are among the common residents. They devote much more care to building their nests than do many of the other species.



THE AMERICAN EGRET LOOKS HAUGHTY

This bird was photographed in a brackish pond on Cumberland Island, Georgia. Here the author had an exciting encounter with an alligator that had appropriated a jacksnipe dropped in the water by the gunner.



THIS IS A TYPICAL SCENE ON CUMBERLAND ISLAND

Marshes in low places and woodland on higher ground provide homes for many kinds of wild life. In the foreground are shown a little blue heron in normal color with one of the young birds in the white phase. To the right is a little scaup duck that is curiously out of place in this shallow water.



THIS LITTLE BLUE HERON IS IN THE WHITE OR IMMATURE STAGE

Note the yellowleg snipe in left-hand corner. It is not at all unusual in the author's experience to find unexpected subjects on negatives of birds and animals.



WHITE IBISES FLY OVER TAMIAHUA LAGOON, MEXICO (SEE TEXT, PAGE 245)



A LARGE WHITE EGRET WINGS OVER CUMBERLAND ISLAND OFF THE GEORGIA COAST

CHAPTER VI — PART II

On Cumberland Island, Georgia

CUMBERLAND ISLAND, which I first visited in the winter of 1885, is situated near the southern border of Georgia and just north of Fernandina, Florida. At that time this property had recently been acquired by Thomas M. Carnegie, a brother of Andrew Carnegie, and it has been occupied by members of the Carnegie family ever since. No more attractive island for a winter residence is to be found on the Atlantic coast. It is about 20 miles long, and several miles wide, and has fine hard beaches, is well forested, and contains fresh-water ponds and numerous lagoons which are frequented by ducks and many varieties of water birds.

ALLIGATORS MENACE BIRDS

The large and numerous alligators that occur here cause havoc among the larger swamp-breeding birds, as well as devour young pigs, deer, and hunting dogs when they cross the lagoons. In the woods are many deer and wild turkeys, but these are sparingly shot, so that the island is really a game refuge for animals and birds. By a coincidence my maternal grandfather had an option on this property in 1866, and for this reason I viewed the attractive surroundings with a special interest.

In 1901 I visited the island again while on a photographic trip, and passed a week in a comfortable cabin six miles up the beach and close to the principal lagoon.

On Cumberland Island were many turkey buzzards, with now and then a black vulture consorting with them amicably. These somber birds often proved a nuisance about the dwellings, but their most serious offense was the habit of plucking out the eyes of newly born fauns. After the lingering death of the victims, the birds patiently awaited until the bodies reached the proper degree of decomposition to suit their taste.

On my arrival at the hunting cabin I saw no buzzards, and thereupon I had John wire a large stuffed owl on the limb of a dead pine. It was my expectation that some of the more pugnacious birds of the neighborhood would attack their nocturnal foe and thus afford me a chance to take their picture while their attention was diverted.

When I returned from my first canoe trip

on an adjoining lagoon, I observed several buzzards flying away. A glance at my lure showed that the legs of the owl, which had been wired to the limb, were all that remained. I searched among the scattered feathers on the ground for the large glass eyes of my dismantled lure, but without success. A large bar of soap left on the wooden bench near the kitchen door for use in washing the dishes had also disappeared.

It may seem strange to charge this larceny to an effort on the part of some buzzard to gratify its appetite, but when it is recalled how readily an alert trout will seize an artificial fly, or how the most cautious of wild fowl will settle down among their wooden counterfeits to be awakened from their sense of security by the booming of a gun, it is more easily understood how the most stolid and stupid of birds should be deceived by the glistening eyeballs, or by something that appears to be delectable food at the kitchen door. The next day I photographed one of these marauders as it released the shutter of the camera by a pull on a baited string.

Among the pictures taken on Cumberland Island is one of a cotton-mouthed moccasin that recalls a rather amusing adventure in connection with another reptile there. Close to the cabin was a small fresh-water pond, where I flushed a number of jacksnipe every time I passed by. I borrowed a gun in order to have game for the table. One snipe soon flew over the area, and when I shot, it fell into the middle of the pond.

WATER MOCCASIN AND ALLIGATOR

Taking off my shoes and stockings, I waded out after it. When I reached the place where the bird had fallen, I could not find it. Consequently I mounted what I took to be a sunken log in order to get a better view. Suddenly the head of an alligator appeared between my legs and I was drenched with water. I had stepped upon a submerged 'gator, which resented such familiarity! Deciding that the snipe must have disappeared down the capacious jaws of this saurian, I went ashore in some haste.

When I narrated this incident to one of my hosts, he declared that I had taken a great risk in wading about this pond. I



IT WAS LOOKING FOR FOOD IN THE SHALLOWS

Where plants grow above the surface of the water near the shore of Cumberland Island, wild fowl find good forage.

scoffed at the idea, saying that the alligator was too small to be feared. To this he replied that it was not the alligators, but the water moccasins he meant, for the pond was filled with them, and that I should always wear something on my feet. Thereupon I suggested that his wishes could easily be complied with, "for I could enter the water barefooted and come out with a 'gaiter' on one foot and a 'moccasin' on the other."

As we were paddling along the largest lagoon one morning, I discovered a pair of white ibises with their crude nest of sticks low down in the crotch of a mangrove that

grew by itself in the middle of the lagoon. Previous to this time I had never seen this bird, and it made so interesting a picture with snow-white body, pink, curved bill, and black-tipped wings, that I was eager to photograph it. I placed the tripod with the camera in the shallow water about six feet from the nest, covered the outfit with green branches, and led a string to operate the shutter back to a neighboring group of mangroves. In order

to give the somewhat distracted parents time to quiet down and to return to their nest, we continued along the lagoon in search of other subjects.

Half an hour later we shoved the canoe into the thicket of mangroves within reach of the pulling string. I was surprised to find that the pair of ibises were still soaring uneasily about overhead. Neither of the birds consenting to return to the nest, I decided to take a picture of the four white eggs. But when I looked into the nest I found it empty. A large water snake coiled about the lower part of the mangrove trunk furnished the explanation.



CHAPTER VII

Florida—Its Woods, Waters, and Wild Life

THROUGHOUT the year Florida is an out-of-doors State. The seasons are only nominal, and gradations between them are almost imperceptible. When the last oranges are being picked from trees continuously green, fragrant blossoms are again whitening the branches.

Animals enjoy virtually unbroken holiday weather, and birds during the so-called winter months surpass in numbers those of the summer, for their ranks are increased by thousands of visitors from the North.

FLORIDA IS "DIFFERENT"

From the time of my first visit to the State, Florida has always appealed to me. Its wealth of wild life, its pleasing variety of vegetation, and its peculiar topography, so different from that of any other region in the United States, combine with its equable climate to form a paradise for nature lovers.

Mainly a fingerlike peninsula 100 miles wide, the State stretches for about 400 miles southeasterly from the continental land mass. The Gulf of Mexico on the west and the Atlantic Ocean on the east give it an extent of more than 1,100 miles of coast line, a length of shore greater than that of any other State.

Florida's mean annual temperature of 70 degrees Fahrenheit is due not only to the southern location of the peninsula but also to the warm oceanic currents on both coasts. Annual rainfall averages about 52 inches.

The land is mainly a limestone plain covered with sandy loam: Low along the coasts, especially in the southern third, it rises gradually to gently rolling elevations, varying at the highest from 300 to 400 feet above sea level and extending from near Lake Okeechobee northward to the border.

For long distances the shore has beautiful beaches of coral sand backed by sand dunes and broken by bays, inlets, and tidal lagoons—curious waterways, usually long and narrow, and paralleling the shore a short distance inland, as do Indian River and Halifax River, the most notable of the lagoons. There are no great rivers in Florida, but the St. Johns River, rising on the east slope in Lake Helen, Brevard County, and flowing northward for 400 miles into the Atlantic Ocean a few miles below Jackson-

ville, is navigable for small steamers for a distance of more than 300 miles above its mouth.

Florida's inland water surface, of approximately 3,905 square miles, is made up largely of small fresh-water lakes of various sizes, none of much depth. The largest, Lake Okeechobee, is about 30 miles wide and 40 miles long, and covers some 1,200 square miles, with an extreme depth of only about 15 feet. Few of these lakes have outlet streams.

Lake Okeechobee has an outlet through the Caloosahatchee River, flowing down to Charlotte Harbor on the west coast. This natural drainage is so inadequate that within recent years five large drainage canals have been cut from the lake to the Atlantic coast. This has lowered the water level and bared a great acreage of formerly flooded peat lands, now utilized for growing early vegetables and other crops.

Most of the lakes are drained by seepage or underground channels, and some are known to have subterranean connections. These pent-up underground waters from the interior furnish an abundant supply for shallow artesian wells, which are drilled along the coasts. In places the water bursts forth in gigantic springs.

GEOLOGICAL BASE OF THE PENINSULA

In 1931 a well was completed to the depth of 6,000 feet in Marion County in the central portion of the peninsula. For the first 4,000 feet it penetrated sedimentary formations consisting of limestone, sand, marl, clay, phosphates and recent deposits of varying character. Then it reached an underlying metamorphic formation, composed of mica, slate, and quartzite, the date of which has not been definitely determined.

Since the formation of these ancient deposits of more than three-quarters of a mile in depth the peninsula has gone through many changes, sometimes for many ages being dry land and then covered by the sea for other long periods, until it became the Florida of today.

South and southwest from Lake Okeechobee, extending to the coast, lie the famous Florida Everglades, a broad, very shallow, swampy basin covering about 8,000



PONCE DE LEON INLET LIGHTHOUSE ONCE MENACED
WILD FOWL

Until this light was changed a few years ago to the automatic flashing type, thousands of birds, from warblers to ducks, perished here during migrations by being blinded and dashing against the tower or the glass protecting the light.

square miles. The land is covered for the most part with from one to twelve feet of fresh water, and a rank growth of sawgrass—a sedge with sharp edges that cut like knife blades—often extends away to the horizon with the appearance of a great prairie. Scattered here and there over the swampy surface of this sawgrass plain are small islands of rich humus soil, a few feet above the water level, overgrown with luxuriant tropical or semitropical vegetation, above which tower the stately royal palms. Along these “hammocks,” as they are called, live the scanty remnants of the romantic and picturesque Seminole Indians.

In this same country lies the Great Cypress Swamp, containing the finest cypress timber in all this region. Along the coastal border of the Everglades is a belt of mangrove thickets, which become a veritable forest in the Shark River section north of Cape Sable; and the “Ten Thousand Islands” along the southwestern coast of the peninsula, north of Shark River, form a long, narrow group of keys overgrown with mangroves and separated by a maze of shallow little tide channels and lagoons paved with natural oyster beds.

Before going to the Bahama Islands in the spring of 1907, I paused at Miami for several days in order to make excursions into the eastern part of the Everglades. Miami at that time was a temporary terminal of the Florida East Coast Railway, then designed to be extended along the keys to Key West.

In a small rowboat I went up a winding stream into a semitropical marshland and was able to visualize the more remote sections. I saw a few alligators and several species of herons, but the other wild creatures were farther inland.

About 18 years later and after the railway was completed, I left Miami with a friend to go over the unique highway to Key West. The superstructure lay close to the water, here and there resting on keys, big and little. Key Largo, one of the intermediate islets, was a popular fishing resort in summer and spring; it is graced with coconut palms and rimmed by white beaches



YELLOW PINES AND LIVE OAKS CONCEAL THE HOUSE

This is the water front of the author's winter home on the east bank of the Halifax River at Ormond Beach, Florida. Here he has pursued his fascinating hobby for portions of many winters.



FISH CROWS CONGREGATE ABOUT A FEEDING STAND AT ORMOND BEACH

From Revels Island, Virginia, to Florida these fellows have increased so greatly in recent years that they have become a serious menace to many other birds, whose eggs and young they destroy.



WHAT IS THE SAD SEA SAYING?

This lone heron was stalking majestically along the shore in March, 1935.

of marl. From the observation car we could look down upon waters tinted blue or yellow, where fish of various colors were outlined sharply against the beds of chalk-white coral.

Naturally at the crowded end of the peninsula one could not expect to see much in the way of bird or mammal life. A short trip in the gulf, however, brings one to the Dry Tortugas Islands, long famed as the home of several large colonies of sea birds, such as noddy and scoter terns, not to be found on the main shore. There, formerly, my friend, Dr. A. G. Mayer, was at the head of the Carnegie Marine Laboratory; after the establishment of these historic islands as a Federal bird reservation his investigations were greatly facilitated.

THE EVERGLADES ATTRACT SPORTSMEN

Interesting and unique as is this chain of keys, separating the Gulf and the Atlantic and used as stepping stones of a highway leading to our southernmost city, the naturalist, sportsman, and bird lover must look largely to the Everglades, and northward, for study or sport. There marshlands and swamps, tidal beaches, and lagoons, thousands of lakes, and many streams winding in and out of pineries to the sea afford homes for the feathered, furred, and finned creatures of the Peninsula State.

The flora and fauna of the northern two-thirds of the State are similar to those of the adjacent region to the north; but from the latitude of Lake Okeechobee south,

especially on the hammocks in the Everglades and along the keys from Biscayne Bay to Key West, the trees and other vegetation are so tropical in character that one might readily believe oneself transported to the coast of Cuba or eastern Mexico.

The long southerly extension of Florida into the sea has made it a highway for many migrating birds, both in fall and spring. The extraordinary number of salt marshes and coastal lagoons, and of fresh-

water lakes, streams, and marshes in the interior has made it the home of multitudes of herons, ibises, pelicans, cormorants, snakebirds, skimmers, gulls, terns, and other water-loving birds without parallel on this continent. Quail and wild turkeys also abound, but the flamingo and parakeet now seem to be gone forever. In the southern keys and hammocks occur several tropical birds, such as the white-crowned pigeon and the Zenaida and Key West doves, while the cayman, or American crocodile, in part replaces the alligator.

As might be expected, the land mammals of the peninsula and adjacent keys appear to be derived entirely from the mainland to the north. When I first studied the region, mammals were plentiful, the main larger species being the white-tailed deer, black bear, puma, wildcat, gray wolf, raccoon, opossum, otter, and skunk. In the salt lagoons along shore were many manatees, a few of which still remain.

Within comparatively recent years, rapidly increasing occupation and development of the State have had their usual effect on wild life. Conservationists, however, have been active trying to save threatened birds and mammals from the local extermination that has overtaken the flamingo and parakeet; and a greater appreciation of the value of wild life appears to be developing among the residents. Improved game laws and this awakened public sentiment make the future appear more hopeful for the wild creatures.



VIEW ACROSS HALIFAX RIVER FROM THE AUTHOR'S WINTER HOME

Bonaparte gulls in winter plumage rest on the water, and an adult ring-billed gull is on the wing. These graceful aviators add much to the attractiveness of the view from the windows.



RED-WINGED BLACKBIRDS IN WINTER DRESS

In winter they come daily in flocks to enjoy the contents of a feeding tray under a large palm tree about 25 feet from a veranda where people are usually gathered, at Ormond Beach, Florida.



A DOVE OF PEACE BECOMES BELLIGERENT

A male Florida ground dove assumes a threatening attitude to drive an approaching blue jay (not in the picture) from the feeding place it occupies.



EVEN A STUFFED OWL MAKES HIM SEE RED

One of the chief delights of a group of Florida blue jays is to locate some sleepy old owl and worry him. This one is attacking a stuffed owl and is a bit puzzled at the victim's docility.



A PAIR OF GROUND DOVES

These beautiful little birds, about half the size of the mourning doves, are common about the yard and orange grove at Ormond Beach, where they live throughout the year.



A FLORIDA GRAY SQUIRREL PULLS ON THE NUT BAIT AND TAKES HIS OWN PICTURE IN THE DAYTIME

Several gray squirrels discovered this feeding place; so corn and nuts were substituted, the loose end of the string being just long enough to permit the squirrel to rise on its quarters—the most graceful and characteristic pose of this animal.

Those interested in preserving parts of the American wilderness have been making efforts to have set apart as a national park about 2,000 square miles in the southwestern part of the Everglades. If this plan succeeds, one of the wildest and least-known parts of the country will be perpetuated in a nearly natural state.

In beautiful hammocks with their tropical vegetation, and in the mangrove and other great swamps, herons, wood and white ibises, spoonbills, limpkins, and other interesting birds may then continue to rear their young in safety. When not nesting, they will still wander in picturesque hordes over the shallow waters of the vast neighboring sawgrass plains.

Without some such organized effort to preserve their haunts, however, the wild life of one of the strangest regions in America is confronted with a perilous future. Birds nesting in colonies, and such conspicuous species as deer and wild turkeys, are threatened with extinction.

I first visited Florida in 1885, and in subsequent years made frequent trips there. In 1906 I established a permanent winter home in a cottage at Ormond Beach, fronting the eastern shore of Halifax River, just below the Ormond Bridge, and since then I have returned with my family every year. Ormond Beach has been the headquarters of my excursions by boat and automobile to other parts of the State.

Halifax River, as previously stated, is a narrow tidal lagoon extending parallel to the coast. Its pass from the sea is at Ponce de Leon Inlet, 18 miles southward from my cottage, and it extends approximately seven miles farther northward. In recent years Ormond Beach, Daytona Beach, and several other small winter resorts have developed on the peninsula, and tourists swarm along the beaches to the inlet. The remainder of this narrow belt is in surprisingly primitive condition, despite the late lamented land boom.

The sandy peninsula, extending about 25 miles north of Ponce de Leon Inlet and lying between the river and the beach, three-quarters of a mile to more than a mile wide, had few visitors in the early days. Along the river, for about 300 yards back, was a forest of yellow pines and low live oaks with much undergrowth. Beyond that to the east, extending to the sea beach, was a much broader belt of sand dunes overgrown with low scrub palmetto and bushes, forming large, almost impenetrable, thickets. From the water the house is nearly concealed amid yellow pines and live oaks.

It was not long before I discovered that in the woods back of my cottage were numerous small animals, wildcats, raccoons, opossums, skunks, cotton-tail rabbits, and wood rats. Occasionally tracks of deer and bears were seen farther up the river.

Purple martins occupied bird houses on the dock. In the growth along the low shore of the river were red-winged blackbirds, marsh rabbits and cotton rats, with fish crows and little green herons perching on the pine trees over the edge of the water. Many different kinds of land birds loitered about the cottage or the orange grove in the rear.

THE AUTHOR SETS OUT HIS FLASHLIGHT APPARATUS

With my guide, John Hammer, I set out a number of cameras connected with a flashlight. At first, the glare of light and the heavy report that followed astonished the people in the neighborhood, but finally they became accustomed to it and would ask each morning what luck I had had the night before.

About the house we placed feeding boxes, and in the course of the season we were able to see nearly every species of bird that lived or wintered in the vicinity. The principal exception was the Florida jay, and this was to be found a quarter of a mile away in the sand-dune scrub nearer the ocean.

No matter how far one may travel by automobile, or how many miles one may walk along forested trails, one sees few of the more timid birds. One may notice crows, hawks, blackbirds, robins, meadow-larks, woodpeckers, and English sparrows, or witness the flight of gulls and other water birds along the beaches; but without a lure to attract and concentrate the smaller woodland inhabitants it is difficult to see or study



ON THE WINGS OF WIND



THE TAKE-OFF



CAUGHT IN THE AIR

The aviator at the top is a cardinal; the two below are blue jays snapped with a fast lens in the author's yard.



BLACK SKIMMERS MASS ON THE TIDE FLATS AT PONCE DE LEON INLET

This species winters from Florida and the Gulf Coast to South America, nesting as far north as New Jersey.



TWO GROUND DOVES PECK AT THE BAIT, WHILE A MALE CARDINAL LOOKS ON

those that in form, plumage, or song differ so much from the commoner types of the open country.

By placing different kinds of food within easy sight, people may attract birds about their homes virtually throughout the year. Many Florida residents have always been interested in bird life, and others have acquired the first knowledge of their feathered neighbors by thus coaxing them from the thickets or woods, where it is difficult to find them with any certainty or to study them carefully.

In the last 20 years I have had three feeding stations at different seasons in widely separated localities—one at my camp on Whitefish Lake, Michigan; another in the suburbs of Washington, D. C., and the third at Ormond Beach, Florida—the three representing a more than 1,800-mile diagonal section of country, in which may be found many kinds of feathered visitors. I

have had thus means of photographing most of the species of this continent.

Passing part of each winter and spring since 1906 on the narrow peninsula lying between the Halifax River and the ocean, I have become much impressed by the many species of small birds visiting or resident there. Some of these are native, others are winter visitors, and a great number loiter for only a day or two in their spring migration. I shall not attempt to list here the hundred or more species that may be seen in the several seasons, but shall confine my comments to the land birds that have been habitués of the feeding-stations placed on platforms or on the ground.

The bird most welcomed was the rich-hued southern blue jay, with its brilliant coat in contrast with the paler hues of its northern relative in Michigan. The cardinal with its bright red garb also had a strong appeal to all of us.



THE FLORIDA JAY IS A FRIENDLY CHAP

This plain, grayish-blue species is peculiar to Florida, where it occurs mainly in the Ormond Beach district, along the palmetto and brushy belt covering the sand-dune area. In the Halifax River country it stays in the shore belt and does not frequent the more wooded vicinity of the river, where the Florida blue jay occurs. The Florida jay has something of the same confidence in mankind as that shown by the Canada jay. The readiness with which it may be taught to come to hand for pieces of bread or other food is illustrated in this photograph, made at Ormond Beach.

The bait used at this southern station consisted of "scratch food," such as is carried by most feed stores; bread broken into small pieces, and suet. Two of the feeding platforms were only a few yards from the front porch, and a third was about 100 yards behind the house in a 40-foot clearing surrounded by bushes and trees, with a couple of orange trees in the center and an observation pavilion on one side, half surrounded by the bushes.

In addition to the jays and cardinals, red-bellied woodpeckers, flickers, myrtle warblers, mockingbirds, chipping sparrows, white-throated sparrows, catbirds, grackles, and red-winged blackbirds visited the front boxes daily. The last-named birds are most unusual visitors to feeding stations near a house, but the proximity of the reedy shore of the river and their observation of other birds feeding served to break down their reserve until they began to come regularly in small flocks.

The companies, which contained young and old of both sexes, congregated in the

adjacent tops of small live oaks, or on the feeding stands for a large part of each day. They became so numerous that, like the starlings in Washington, they quickly consumed the feed put out.

One winter I saw a male grackle carry away a large piece of dry bread and soak it in a near-by bird bath. After a moment he pulled it out and ate it without difficulty. This act I attributed to a specially ingenious individual, but later I saw the same thing done by other blackbirds and decided it must be a characteristic habit.

The same species came to the feeding box in the thicket as to those in front of the house, excepting the red-winged blackbirds, but on the ground in the thicket station were several other birds that love to keep close to shelter. Among these were bobwhites, mourning doves, ground doves, brown thrashers, and numerous chewinks in their handsome black, white, and brown colors. The odd habit chewinks have of scratching the dirt vigorously made them appear like little barnyard fowls. These



BLACK SKIMMERS WHIR ALOFT AT PONCE DE LEON INLET

These birds are nearly white below and black above. Graceful on the wing, they make a charming picture against a gray sky above the desolate and barren sands.



AT LOW TIDE BLACK SKIMMERS GATHER IN LARGE NUMBERS ON THE BARE SAND AT THE INLET



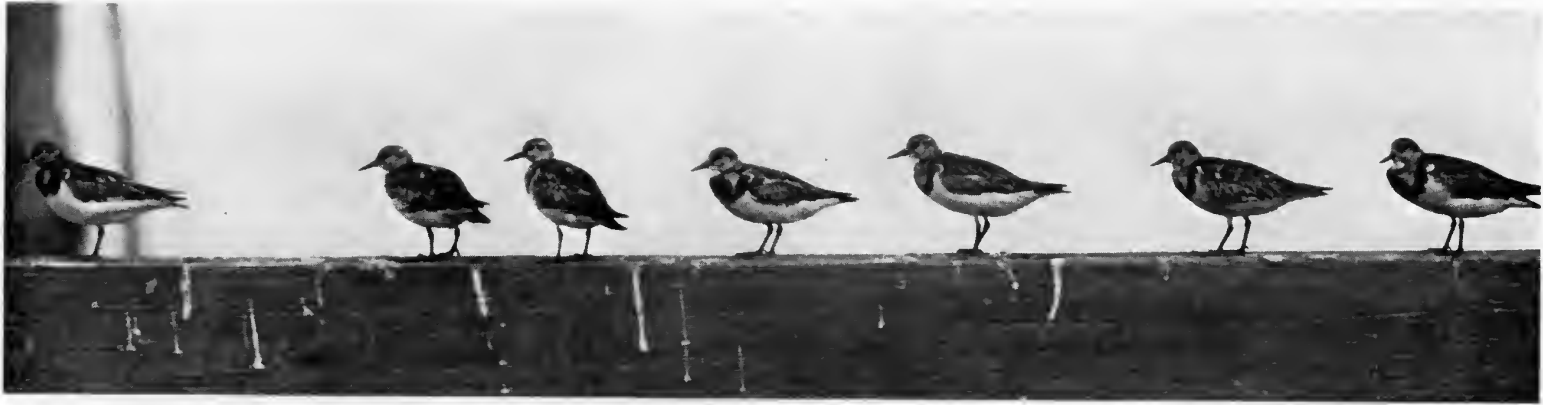
WHEN ALARMED, BLACK SKIMMERS TAKE WING IN A COMPACT FLOCK

Their appearance is so different from that of the gulls and terns, with which they are neighbors, that they may be readily distinguished at a long distance.



BROWN PELICANS COME TO REST WITH FULL POUCHES

They are alighting on a sand bar exposed by the falling tide at Ponce de Leon Inlet. They have come from fishing for menhaden off the adjacent coast and remain in large groups digesting their prey until high tide starts them off again.



RUDDY TURNSTONES, OR CALICO-BACKS, SIT ON THE RAILING OF THE APPROACH TO PORT ORANGE BRIDGE, FLORIDA

They are waiting near an oyster-shucking house for the dumping of empty shells, among which they search for food. These little waders are more ornate than most members of the snipe family, to which they are related.



GULLS AND TERNS CONGREGATE IN LATE WINTER ON DAYTONA BEACH, NEAR PONCE DE LEON INLET

A stretch of 20 miles of flat, hard sand at low tide here has been the scene of many famous automobile speed trials and world records. The beach is also traveled by many waders and other birds during migrations. This photograph shows herring, ring-billed, and black-headed gulls and royal terns.



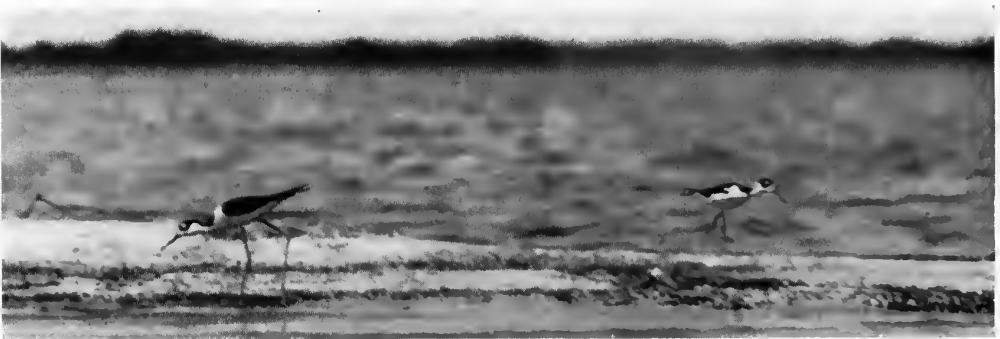
RUDDY TURNSTONES FLY ALONG THE MARGIN OF THE WATER

These handsome little waders, like their relatives of the snipe family, contribute much to the pleasure of the bird lover who strolls along Florida beaches. They come in early spring and give animation to the flat landscapes.



SANDERLINGS STRUT ALONG DAYTONA BEACH

During the late winter and early spring many shore birds appear along the shallow borders of lagoons and on the sands. They are interested not in what "the sad sea is saying," but in what bits of food the waves may bring to them.



A PAIR OF LONG-LEGGED, BLACK-NECKED STILTS REST IN MOSQUITO LAGOON

These fellows are admirably equipped for surf wading, for their spindly underpinning offers little resistance to the rushing water. They are famous travelers, journeying from the Middle West of the United States to the Canal Zone and Mexico. The author has photographed them throughout their rooks.



ALONG ORMUND BEACH THE AVIAN POPULATION IS COSMOPOLITAN

Almost every drive along the miles of smooth sand north of Ponce de Leon Inlet in winter will reveal a new combination of birds. They may be a businesslike troop mainly of young herring gulls on their way to a better feeding ground; or, as shown here, a small flock of willets.



SCAUP DUCKS RISE GRADUALLY FROM THE SURFACE

This photograph, taken at Halifax River, Florida, shows the manner in which these waterfowl make their take-off. They are not so quick and graceful as some of the other species, and there is considerable splashing and spray as they leave the water.



BONAPARTE GULLS AND LESSER SCAUP DUCKS FRATERNIZE NEAR DAYTONA
Birds of different species sometimes avoid each other, but these get along in friendly manner.



SANDERLINGS BRING CHEERY ACTIVITY TO DAYTONA BEACH
These nimble little sandpipers are common all winter along the shore sands of Florida. They nest in the far north, half the world away from this sunny clime.



LESSER SCAUP DUCKS SHARE TIDBITS WITH BONAPARTE GULLS

There is nothing "upstage" about these waterfowl. So long as food is available they are unconcerned about their avian neighbors (see opposite page).

interesting occupants of the thickets are willing but not gifted vocalists.

Dr. Frank M. Chapman has written concerning the male: "When the desire to sing comes upon him, he leaves his lowly haunts and, taking a more or less exposed perch, 15 to 20 feet from the ground, sings with an earnestness which goes far to atone for his lack of striking musical ability."

Among the birds that fed on the grain scattered about in the rear lot was the beautiful little ground dove, which surprised me by its belligerent ways. Surely it was no emblem of peace, for it drove away every other bird in sight, attacking with equal vigor either its neighbors or those of its own kind; the duels between them on the ground or in midair showed the strong determination of each to be the sole guest at the banquet.

An essential in attracting birds is a supply of water placed either in a concrete basin elevated several feet, or in a galvanized pan sunk into the ground. They enjoy drinking or bathing every hour of the day.

In contrast to the many land birds seen almost daily about my winter home were those seen on voyages in my little house

boat *Heron* on the Halifax River and connecting waters. The craft had accommodations for several passengers, the rear containing the engine, kitchen, and quarters for the guide. Its draft was about two feet, and the maximum speed around nine miles an hour. Large windows running the entire length of the cabin gave an unobstructed view of the surroundings.

We used the boat for visiting such places as the beautiful Tomoka River, where in the marshes alligators basked in the sunlight, and ospreys nested in solitary pines. Farther up the river there was good bass fishing in pools edged by moss-draped trees. In the other direction, near the Ponce de Leon Inlet, we could pass a day or two near the colonies of sea birds massed on the sand bars.

We made more extended trips southward, visiting in successive springs the lower end of Mosquito Lagoon, where the broad, shallow waters lie between the ocean beach and the head of Indian River. One large mangrove island was occupied by breeding pelicans and Ward herons, and the mud flats near by were dotted with active groups of sandpipers or the more stately willets and black-necked stilts.



MOCKINGBIRDS ENJOY THE SUET

At Ormond Beach the pair that lived in the author's yard were regular guests at the piece of this delicacy which was attached to a tree trunk.



RING-BILLED AND BONAPARTE GULLS ARE EAGER BEGGARS

These birds are contesting noisily and with much flapping of wings for scraps of bread thrown to them from the Daytona waterfront.



FLORIDA QUAIL TAKE THEIR OWN PICTURES AMONG THE PALMETTOS

This type of bob-white is a little darker colored than the familiar northern bird, but its habits and cheerful call notes are virtually the same as those of its better known cousin. The bait so tempts them that they are oblivious to the mechanism their pecking has set in motion.



A MYRTLE WARBLER WAS A FREQUENT CALLER



A MOCKINGBIRD TAKES HIS ORANGE JUICE

These little fellows were bolder than their neighbors; one of them even knocked over a stuffed screech owl placed on the author's lawn (see accompanying text).

I could always create an interesting diversion on my front lawn by placing a stuffed screech owl on a feeding box. In a few minutes a blue jay would utter harsh notes from the neighboring trees with an intonation indicating alarm or indignation, and open a chorus of its fellows. The jays, gathering like a clan on the warpath, would dart from the treetops down at their hated nocturnal enemy. Their assaults would become bolder and bolder until they would finally knock the little victim off its perch.

A STUFFED SCREECH OWL CREATES EXCITEMENT

Although many birds joined the jays in uttering cries of protest, a mockingbird proved the boldest of all; for, unsupported by any of its kind, it would often strike the little owl on the back of its head, and in one instance it knocked over even a great horned owl that had been wired loosely to the top of a fence post.

Blackbirds and similar species that were accustomed to move about in flocks fed more or less amicably side by side, but most of the others came singly and often appeared to be more tolerant of strangers than of their own kin. In many years of observation I never saw a Florida jay about the premises. In the bushes along



A BROWN THRASHER APPROACHES A FEAST

Common in winter along the Halifax River, these birds come freely about the author's premises to partake of halved oranges and other food provided.



THE CATBIRD ENJOYS A HALF ORANGE

Like the brown thrasher in the upper picture, this chap enjoys the author's hospitality. It looks around alertly, however, to make sure that no enemy is in sight.



FLORIDA QUAIL FIND SEEDS PUT OUT FOR SMALLER BIRDS

Six pictures of this flock the author took by pulling the string, and the quail recorded two others during his absence (see, also, illustration, page 153). In the above group are four cocks and two females. The cock in the center released the shutter by pecking at a seed attached to a string to the camera.

the ocean front half a mile to the east, however, they are numerous; and many cottagers living in the brushy sand-dune belt had them as daily visitors. At times these birds were so tame that they would eat readily from the hand (see page 143).

These jays afford a good illustration of the restricted distribution of certain birds. Unexpectedly, robins at Ormond Beach furnish somewhat similar evidence. Though millions of them move south from the northern States in winter, I have seen only one on the peninsula east of the Halifax River. On the main shore to the west they are often seen.

A CONGREGATING PLACE FOR SEA BIRDS

The mouth of Ponce de Leon inlet (formerly called Mosquito inlet), which forms the mouth of Halifax River, is a broad gap cut through the sand dunes that border the ocean front along most of eastern Florida. Flanking the channel just outside, and lying immediately inside this pass, are broad sand bars and flats that become exposed at

low tide and serve as favorite gathering places for thousands of birds belonging to the several species that glean their subsistence from the adjacent waters. Their main resting places are on the sandy flats inside the inlet, on the south side.

Sometimes 500 or more brown pelicans may be seen, all standing in groups in close array. These birds have been working up and down the coast offshore, fishing for menhaden, and now come with well-filled gullets to the broad flats to bask in the sun and doze away the hours while digesting their finny prey.

On other parts of the sand flats may be seen blackish patches formed by hundreds of skimmers gathered in groups; and elsewhere are similar but smaller congregations of royal terns, with scattered representatives of other kinds of terns close by. Near these or by themselves are groups of herring, ring-billed, Bonaparte, and laughing or black-headed gulls.

When these fish-eating birds are seeking food, they spread over the face of the



YOUNG PELICANS EXPRESS DISAPPROVAL OF THE CAMERA

Huddled against the far side of their nest of sticks, they registered disgusted protest. With these birds, the author had difficulty because of their tendency to panic (see text, page 167).



THIS FLASHLIGHT PICTURE CAUSED A PELICAN PANIC

The flash and report caused the birds to leave their nests in fright and fairly mob the occupants of the boat. They struck the jacklight, and some fell aboard. The alarm among the birds was so great that no further pictures were taken at night (see text, page 167).



BROWN PELICANS ARE BUSY ON PELICAN ISLAND, EASTERN FLORIDA, DURING THE NESTING SEASON

Long ago, when these and other birds occupied the island as a breeding place, it was heavily overgrown with mangroves. As the years passed the mangroves were killed by the excrements of the birds. All departed but the pelicans, which built nests on the ground. So many of them made their home here that they began to breed in December and continued to do so at intervals until May.



A FLIGHT OF PELICANS APPROACHES

This wingshot with the camera was even more difficult than a shot with a gun at waterfowl coming head on, and its success afforded the author far greater and more lasting satisfaction, for it gave him a trophy not of one bird but of a considerable flock.



NEST AND EGGS OF THE BROWN PELICAN

waters in wide array; but when they take their daily siestas they prefer the close companionship of their own kind and stand almost touching one another. The amicable relationships of the great groups are interesting, and I cannot recall ever having seen any sign of bickering among them. Another noticeable characteristic of all these birds is their habit, when standing in close formation, of heading toward the wind. Thus their array has somewhat the appearance of a military formation.

During the resting periods a few fish hawks may be seen hovering over the mouth of the inlet, with enough pelicans, gulls, and terns on the wing to give a sense of pleasant animation to a scene otherwise smacking of somnolence. The liveliness is enhanced by an occasional black-breasted plover, willet, or a group of sandpipers, on the beaches.

Whenever something alarming occurs, like the report of a shotgun or the passing of a large, noisy motor boat, all the birds take wing, and for a time the air is filled with a profusion of graceful forms. Even the clumsily built pelican has a wonderful mastery of the air. "The Inlet," as this locality is known by the people of the neighboring towns, is at low tide a favorite place for visitors wishing to study the birds with field glasses.

I have already expressed the opinion that there is no more convenient form of outdoor shelter than a motor-driven house boat of light draught. It may be anchored near the gathering or breeding places of aquatic

birds or may be taken to some fresh-water lake in a locality remote from settlements, where the animal life exists undisturbed.

One afternoon we anchored the house boat in mid-channel half a mile above the Halifax inlet, in order to study and photograph the morning and evening feeding flights of black skimmers, which have the habit of fishing throughout the night. Whenever we disturbed the skimmers in their midday resting places on sand bars, they filled the air with an almost solid mass of fluttering wings, flying in closer formation than any of the larger water birds I have ever seen (see page 145).

Late in the afternoon, the skimmers separate into small files of a dozen or more and, with open bills, fly rapidly along close to the water. They keep the blade-like lower mandibles below the surface, so that they literally "plow the main," scooping up the small aquatic animals and usually "uttering a sharp *yap, yap*, like a pack of hounds on the trail."

Being partly successful in our efforts that afternoon, we concluded to stay at the same anchorage until the following morning, when there would be another flight of the birds. Just after dark an unusually strong wind came out of the north, and, with a high tide running out, the boat was subjected to a heavy pressure from the combination of wind, waves, and ebbing tide.

Fearing that under such conditions the craft might drag its anchor, we kept watch on the shore line to detect any change in our position.

THE HOUSE BOAT GETS A BUMPING

About 10 o'clock, while John and I were contentedly listening to the tumult outside, there came a tremendous crash on the port side. The windows rattled, loose articles fell to the floor, and the little craft shivered from bow to stern.

John seized a large wind-proof lantern, which had been kept lighted for any possible emergency, and, hastening out on the stern deck, saw a 75-foot scow swing away in the darkness. We recalled that earlier the scow had been anchored half a mile above us.

Evidently the scow was slowly dragging its anchor, and unable to withstand the pressure exerted by the wind and tide, the long cable was permitting it to swing back and forth like the pendulum of a clock. The



“DIGNITY PERSONIFIED”

The young brown pelican in its downy stage is a proud fellow. The photograph was taken at Indian River, Florida, where there are thousands of the species.



YOUNG PELICANS RETURN FROM FISHING

Although awkward and ungainly in appearance as they stand on shore, these birds have a marvelous mastery of the air (see text, page 160).



A GROUP OF FINE OLD PELICANS AND A FEW YOUNG FACE ONE WAY



ABOUT 1,000 YOUNG PELICANS BATHE AND PLAY AT THE WATER'S EDGE

These birds are most gregarious in their habits, often standing shoulder to shoulder in almost military array, as in the upper picture.



PELICANS HUDDLE IN THE SHADOW OF AN APPROACHING THUNDERSTORM



THE CAMERA RECORDS THE RISING FLIGHT OF A PELICAN



IN THIS POSE THE PELICAN RESEMBLES THE CANADA GOOSE



GROUPS OF YOUNG PELICANS ARE PHOTOGRAPHED AS THEY SLEEP AND AS THEY PREEN THEMSELVES

question now arose whether on its return swing the scow would strike our boat again.

Anxiously peering into the darkness, we soon saw it coming back, but fortunately it missed our stern by about 5 feet, striking the rowboat that was fastened behind, but apparently not injuring it.

When the danger had passed, we realized that had the scow struck the bow of the house boat it might have forced it under water. We should have sunk within a few minutes, or if our anchor chain had broken as a result of the pressure we should have gone whirling down on the swiftly running tide to the open sea, where the wind was driving huge waves into the mouth of the inlet.

Since our engine was often slow in getting into action, we might easily have been forced into rough water with little chance of keeping afloat. Next morning the scow lay high and dry on a sand bar a short distance below us. The falling tide had saved it from going out to sea.

For many readers of these chronicles big game hunting may lie beyond the horizon, but any who so desire may have delightful adventure in photographing the ordinary forms of wild life. Some of my pleasantest thrills have come from taking portraits of unexpected visitors to my country home, although I have gone far afield for nobler quarry.

SMALL GAME PLENTIFUL IN A FLORIDA ORANGE GROVE

Near my Florida home the scene of many interesting hours has been an orange grove which extends back to a wall of low forest and undergrowth thickets. There one winter I took advantage of a long dry period, when all wild things were eager to find water, to make some special observations.

I sank a small wooden pail level with the ground among the orange trees, filled it with water, and placed about it a supply of seeds, bread crumbs, and a cut orange. About 20 feet back from the drinking place I erected a small green canvas observation tent and partly covered it with palmetto leaves.

Many small visitors soon came to sample the fare provided, and each day I moved the tent a little nearer the bait and water, with no sign from the visitors that they distinguished it from the natural surroundings. On the fourth day, for the first time, I entered this blind and, using my 14-inch

focus lens, proceeded to record the doings of the patrons of my small, out-of-doors restaurant.

In succeeding days I passed a total of about four hours in this blind, and photographed a mourning dove, a ground dove, a pair of quail, a pair of cardinals, a pair of chewinks, a brown thrasher, a mockingbird, gray squirrels, cotton-tail rabbits, and roof rats. Several of the species in the pictures were shown approaching or sampling split oranges, which appeared to be favored by several of them, although they had not learned to open the fruit. The quail excited my interest the most—their appearance was entirely unexpected, although for several days I had heard their melodious spring notes in the neighborhood. In later years several coveys of these birds made their homes about us.

BROWN PELICANS OF INDIAN RIVER

For many years I had been familiar with the pelican colony on Indian River, Florida. On April 21, 1903, I visited Pelican Island to take flashlight pictures of the breeding birds, but when I fired the first flash the whole colony took wing and passed so low over the boat with its glaring lantern that we were fairly overwhelmed by them, their flapping wings and large bodies banging into or over the boat. Crouching down in the bottom, with the cameras dashed from the bow, we waited until the avalanche was over.

My Virginia guide, a stranger to these waters, was somewhat outraged by this performance, and he remarked as he tossed a flapping bird overboard, "Darn these pellicans." Through fear of further disturbing the birds in the midst of the nesting season, we quietly withdrew with a single much-prized picture to our credit, and decided to carry on our photographic activity only by day.

Another season, in company with Doctor Chapman, I revisited the island, he to take moving pictures of this wonderful colony, some by the new colored-plate process, and I to get photographs of these birds in flight and to find some suitable subject for the stereoscopic camera. On March 10 we found about 500 young birds ready for flight. Scattered about were the mummifying bodies of fully 800 more that had been killed in a midnight raid by local fishermen.

Disregarding the fact that the pelicans live almost wholly upon the nearly worthless menhaden, which they take in the open sea, the fishermen in recent years have shown unrelenting enmity toward these birds, because occasionally the young, in their early efforts, catch a few mullet in the Indian River and other coastal waters.

When going to or returning from the fishing grounds, the pelicans usually fly in flocks of from four to 10, in single file, sometimes abreast and sometimes in echelon, the leader setting the pace and the rest in slow measured strokes, flapping or sailing in unison.

COLOR OF ADULTS AND YOUNG

The adult, in the breeding season, has a seal-brown head and neck and a yellowish crown, the remainder of the body being silver-gray. The half-grown young are covered with a soft, white down, which later changes to dull-gray and brown plumage.

After Pelican Island was made a Federal reservation, the birds did not frequent it much, if at all, during the nonbreeding period. As the time approached for them to assume family duties, they did not straggle into the breeding place; but just in advance of the nest-building time, late in October or in November, they suddenly appeared in considerable numbers, as if by a general understanding.

Within a few weeks the nests were built, and in December many of the birds were occupied with their family cares, while others appeared to await their turn in this congested nursery. Because of the limitations of the area available, the pelicans nested on the island more or less continuously from November until May. On the Gulf Coast at Tampa Bay and Charlotte Harbor the nesting season does not begin until spring.

When Doctor Bryant visited the island late in the 1850s, the pelicans and thousands of other birds were nesting in the tops of a heavy growth of mangroves that covered it, as they still do the adjacent islands. In 1898 Doctor Chapman found some mangroves left in which a few pelicans had nests, but most of this growth was gone, and the majority of the birds were nesting on the bare ground.

Before Pelican Island was finally deserted, the mangroves had all disappeared, and the entire colony was forced to nest

on the ground. Its attachment to the locality appeared greater than its desire to nest in the tops of mangroves, which were plentiful on adjacent and apparently equally suitable islands within about a half a mile. All the other birds mentioned by Doctor Bryant had long before left this island for more congenial haunts.

Brown pelicans, unlike the boobies, usually raise two or three young and so apparently have a better opportunity to survive. The continued abundance of the boobies about their favorite haunts seems to indicate that they are less subject to harmful vicissitudes than are the pelicans. Otherwise these last would increase to a far greater extent than they do.

One rather surprising cause of the decrease among brown pelicans on Pelican Island is the cannibalistic habit of the large or nearly full-grown young of catching newly hatched younger birds, left unguarded for a short time, and gulping them down as choice morsels. Fortunately for the future of their kind this is not a common practice.

THE FIRST FEDERAL BIRD RESERVATION

The brown pelicans of Florida owe much to the interest taken in their welfare by nature lovers outside the State. It was due mostly to their representations that on March 14, 1903, President Theodore Roosevelt set aside, under Federal guardianship, the Pelican Island Bird Reservation, the first refuge of this kind ever made in the United States. This splendid precedent has since been followed by the setting aside of more than 90 similar reservations scattered over the entire country and as far as Alaska, the Hawaiian Islands, and Porto Rico.

In 1906 Indian Key, a breeding place for brown pelicans on the coast just north of Tampa Bay, was made a reservation, and others have followed. Without these sanctuaries it is unlikely that these remarkable and picturesque birds could have survived the ill-founded but persistent enmity of Florida fishermen.

It has been a source of amazement to me that some of the fishermen of the State, so notoriously wasteful of fish life because of their plying such illegal practices as "stop netting," and seining in forbidden waters, should continue to blame the really innocent pelicans for the decrease of fish caused willfully by themselves. Some of



A PELICAN NESTS ALOFT IN ITS NEW HOME

When the brown pelican colony deserted a century-old gathering place near Sebastian, Florida, its members selected the large and partly wooded Brevard Island in the Mosquito Lagoon, east of the northern end of Indian River. There they built their nests in large mangroves, thus reverting to the normal habit of this bird in Florida.

them have frankly admitted the unjust character of the charges against the pelicans and have recognized the harmfulness of the methods of fishing so commonly in vogue.

PELICANS REPLACE OLD FAVORITES

As the direct result of Federal protection, now aided by much favorable local sentiment, brown pelicans may be seen every day flying along hundreds of miles of the Florida coast and about its bays and lagoons, where they are always objects of interest. In part they fill that vast hiatus left by the disappearance of enormous num-

bers of herons and ibises, of the roseate spoonbill now nearly gone, and of the flamingo, which long since became extinct on these shores.

Soon after Pelican Island was made a Federal bird reservation, the National Association of Audubon Societies, which had been active in its establishment, cooperated with the Biological Survey in maintaining a local warden to guard it. As a means of notifying the public that the birds on the island were wards of the Government and were not to be disturbed, a great board sign with large letters warning off all trespassers was erected.



THE WARD HERON IS AN AVIAN ICHABOD CRANE

While visiting the brown pelicans at Brevard Island, the author had a fine opportunity to get records of these birds in numerous strange postures, worthy of places on Japanese screens.

That this innovation on their breeding grounds was not appreciated by the birds soon became evident; for when Doctor Chapman visited the place in the spring of 1904, the next year after the reservation was established, he found not a single pelican on the island. More than 700 nests had been built on adjacent islands. The next fall the actions of the birds so plainly showed their objections to the sign that the warden removed it. At once the birds re-occupied the premises.

At the time of the general land development that began in Florida after the World War, two patches were cleared in the mangroves and two small frame houses were built on the eastern shore of Indian River

about half a mile from Pelican Island. These houses and the disturbance caused by their occupants' small motor boats, which were continually going past one end of the island, so worried the birds that they set about moving to another home. In the fall of 1922, between 2,000 and 4,000 birds came to nest on Pelican Island, but a few dissatisfied pairs, instead of trying a new place in the district where they had lived so long, went north to Brevard Island, near the south end of Mosquito Lagoon.

THE HOUSE BOAT VISITS MOSQUITO LAGOON

After it was learned definitely that the brown pelicans had deserted their century-old home on the Indian River and had established farther north a new and apparently permanent one at the lower end of Mosquito Lagoon, we decided to go there in the house boat.

On April 14, 1924, in company with Doctor Nelson, I left for the lagoon. We paused overnight on Halifax River near the inlet, where many skimmers were in their usual haunts, even at this late date.

On the following morning we took on board the Federal game warden of the district, who was to be at the wheel in traversing a long stretch of tortuous or shallow waters, the navigation of which required expert knowledge of local conditions. John Hammer took charge of the engine and the frying pan, two items of great importance to the running of the boat and to the well-being of its passengers.

Soon after starting we passed New Smyrna, an attractive little tourist resort

that had been greatly invigorated by the development there of the shrimp industry. When we reached the head of the lagoon, we were only a short distance east of the canal leading into the headwaters of the Indian River, a locality still known as the "Haul-over" from the early days when boats were portaged on a tramway across a neck of land. This canal diverted all the traffic of launches and house boats on their way down the inland waterway to Miami.

With no such travel on the rest of the lagoon, visitors like ourselves could study bird life under favorable conditions. Every evening, however, a fleet of fishermen's motor boats spread out over the lagoon and drew their seines at night in the belief that it was easier to ensnare the fish after darkness. These visitors were regarded by us with some interest, for their glowing lanterns and gasoline torches gave a sort of Venetian touch to the calm surrounding waters. Their activities afforded a supply of fresh fish, in kind and size suitable for our requirements.

We arrived opposite one end of the new pelican home on Brevard Island about 7 p. m. and anchored some 300 yards to the north. A few belated pelicans were still returning from the ocean, indicating that a greater number would be found nesting in the long line of mangroves.

On landing the next morning, we were first attracted by several hundred feathered skeletons—mute evidence of a raid made a month before by local fishermen, and of the same merciless slaughter as that suf-



THE WARD HERON AT REST IS COMELY

It is only when flying (see opposite page) that it seems grotesquely angular and awkward.

fered by the birds' ancestors at their Indian River home about 17 years before. As in the former case, the fishermen believed that the thousand or more pelicans meant that much competition in the fishing business.

Since learning that the pelicans get their food supply from the ocean, the fishermen have left the colony unmolested. This security, however, may be due in part to the fact that the island has been made a Federal bird refuge.

A more encouraging sight than the dead birds on the ground was the large number of pelicans nesting in the mangroves, where the big nests of sticks were built on the lower and stronger branches. The weight



"OLD BILL" GATHERED "TOLL" AT PORT ORANGE BRIDGE

The great blue heron is usually one of the shyest of birds, yet this member of the species has for years regularly frequented the bridge and taken his gleanings from the fishermen along its rail (see text, page 176).

of the clumsy parents and the ever-increasing burden of the young require a well-supported nest. It was the first time I had seen the pelicans of eastern Florida occupying nests in trees. At their former home on Pelican Island, all mangroves had disappeared, and the hundreds of nests were built on the ground, where skill in construction was not required.

DIGNIFIED PELICANS ENJOY EASE

It was necessary only to select a site on the more elevated portion of the island to avoid inundation from flood waters. After easily obtaining pictures of the tree-nesting birds, we visited a little horseshoe bay a short distance from the nests, where the

sloping, sandy shores were lined with hundreds of dignified-looking pelicans quietly sunning themselves, while many others were splashing about in the water as if having an aquatic tournament.

Passing eastward, we came to a clump of high mangroves, and, to our gratification, found about 25 occupied nests of the Ward heron, a light-colored phase of the great blue heron. This was a bird I had never photographed, although occasionally I had seen one well out from shore in shallow water.

THE HERONS TAKE ALARM

No sooner had we come in sight of this rather rare breeding place than all the adult herons departed separately, alighting here and there in a foot of water 100 yards away from their deserted nests. I erected my little green umbrella blind close to a tree containing two nests in the upper

branches. These structures were very light and frail compared with those of the pelicans, but they commanded an extended view and offered a striking example of the difference between gregarious birds and those that lead a more or less solitary life.

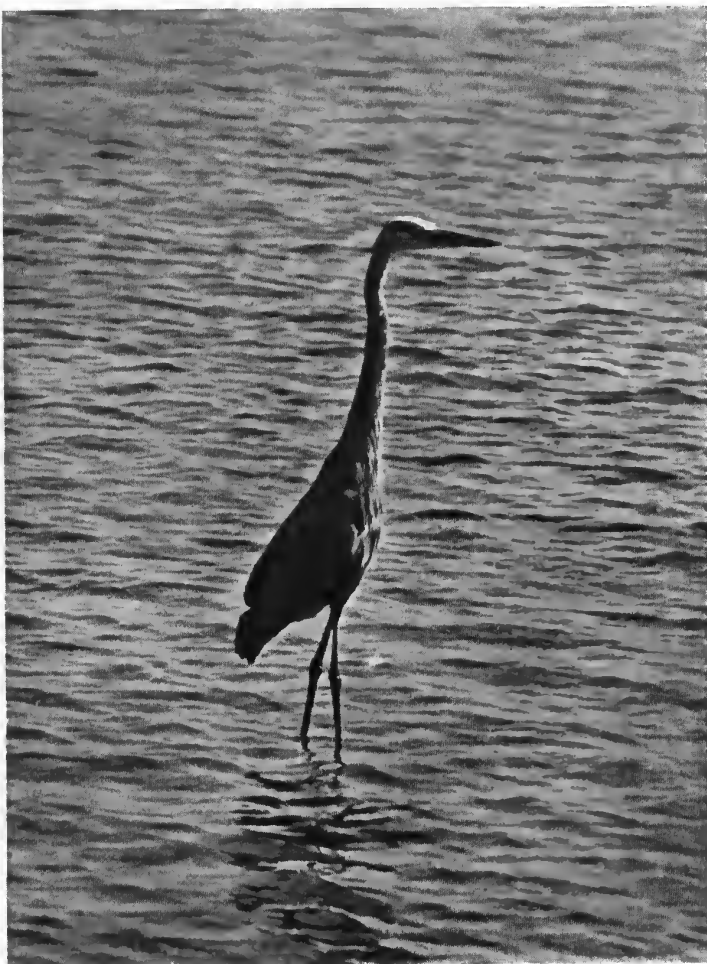
It would be hard to find a more stolid and tamer bird than the pelican, or one more watchful and alert than the great blue heron. This latter wader of the shallows is ever on the lookout for signs of danger and has developed a much higher degree of caution than one would expect in a bird that is neither sought for the table nor regarded as harmful in any way to other forms of wild life.

After I had entered the blind, and the skiff had returned to the house boat as ostensible evidence that the party had gone, the herons began reconnoitering overhead, but were still suspicious of my blind. Consequently I cut some long branches from a mangrove and screened the green canvas covering.

The parent birds now began dropping lightly down upon their elevated nests, and I obtained a series of satisfactory pictures, some showing the herons passing overhead with their long legs stretched out behind like aerial rudders, others descending or ascending, and now and then one standing like a sentinel on the tree-top or bending over the nest in regurgitation. The size of the fish being fed appeared to depend upon the age of the young birds. A day later, entirely content with our first visit, we left these interesting scenes and headed for the Halifax River, determined to return the following spring.

In the middle of April, 1925, I again went to the lagoon, accompanied this time by Doctor Chapman, whose special purpose was to obtain half a dozen pelicans for the American Museum in New York. These were to be shown later beneath a dome, the mounted specimens suspended high overhead by invisible wires, in a realistic representation of the birds in their columnar flight.

This time the house boat was anchored a little way to the east of the island, where, in the morning and late in the afternoon, the pelicans passed overhead. Chapman was able to select the birds he wanted.



CROP FULL, "OLD BILL" BECOMES ALOOF

When his appetite is satisfied, Bill leaves the bridge for a shallow bar immediately above it, where he stands for hours apparently in dignified consideration of such matters as occupy a heron's mind.

We passed several days exploring the shores, where the slight fluctuations caused by the going and coming of the tide north of the lagoon temporarily flooded numerous sand bars and mud flats, thus furnishing the shore birds many forms of life not readily obtainable in stationary waters.

This was the only place in Florida where I found conditions so favorable for shore birds. Kinds noted included willets, yellow-legs, calico backs, black-breasted plovers, several species of sandpipers and some long-legged stilts, which, dressed in a striking combination of black and white, stalked about in unconcern. I had not seen this last-named southern wader since my trip to Mexico in 1910.

Early in the spring of 1927 Doctor Nelson, on his second trip to Brevard Island, in company with the local game warden, found 80 white pelicans resting with their brown relatives in the lagoon near one end of the reservation. They had come from the Gulf coast where they winter every season. Since then white pelicans making winter visits to this place have been observed repeatedly.

The differing methods of these two species in catching fish are interesting to observe. The brown pelican dives heavily with a loud splash from a height of 20 to 75 feet, sometimes disappearing below the surface, and capturing the fish in the distended pouch. The white species swims about in a dignified way and scoops up fish near the surface, as in a dip net.

Both on Yellowstone Lake and Henry Lake, Idaho, I have seen the white pelican capture fish as agile as the trout. This species might prove harmful if it became abundant on the lagoons along the east coast of Florida, but at present it is an uncommon visitor there and is the object of much interest. In 1926 white pelicans were found nesting in considerable numbers as far south as a small island off the Gulf coast of Texas.

OLD-TIME ABUNDANCE OF FLORIDA BIRDS RECORDED BY DOCTOR BRYANT

To illustrate the almost incredible abundance during the past of water birds in Florida, I quote the following from an account of Pelican Island as it was seen in 1858* by Dr. Henry Bryant, an early ornithologist:

The most extensive breeding place he visited "was on a small island, called Pelican Island, about 20 miles north of Fort Capron. The nests were here placed on the tops of mangrove trees, about the size and shape of large apple trees. Breeding in company with the pelicans were thousands of Herons, Peales, Egrets, the Rufus Egret, and Little White Egret, with a few of the Great Blue Herons (Ward Herons), and Roseate Spoonbills; and immense numbers of Man-of-War birds and White Ibises were congregated on the island."

The mangroves as reported here so plentiful in 1858 were killed by the birds nesting in them so abundantly. They completely disappeared years ago. With them

went also the swarming bird life of other species that made this one of the most marvelous breeding places for large birds ever recorded. The brown pelican alone remained faithful to the ancient home until they were crowded out by man.

For many years after I began visiting the Halifax River country, more than 45 years ago, little blue and Louisiana herons were very abundant, and both the snowy and the large American egrets were numerous, not only in the river but everywhere in swampy ponds. They were an interesting part of the landscape wherever one went.

EGRETS GRACEFUL IN FLIGHT

Their morning and evening flights over the river were such notable sights that people made excursions to observe them and to admire the beautiful forms of the birds in the air. These flights were made northward up the river early in the morning and southward in the evening back to their roosting places on some mangrove-covered islets in the river a few miles above Ponce de Leon Inlet.

There the little blue and the Louisiana herons gathered each evening by thousands in the winter months, and in April or about the first of May many of them set up house-keeping and raised their young. At one place several miles above my cottage on the river was a strip of tall reeds about a quarter of a mile long, where hundreds of herons roosted each night.

For the same purpose others came in small parties to some small reed patches along the river bank within a few hundred yards above Ormond Bridge. These birds could be seen from the highway as they came down to the larger patch of reeds, and from the shelter of some small trees they could be observed at close range in the reeds near the bridge.

These herons gave a delightful animation to this area and served as an unusual attraction to northern visitors. They were regarded as permanent occupants of this district, where no one molested them. Since about 1920, however, they have steadily decreased, until during the winter of 1930-31 the appearance of a few of them was a cause of comment.

Since they have had protection under both State and Federal law, as well as the good will of the community, their disappearance is hard to explain. No signs have been noticed of any disease affecting the

* Boston Society of Natural History, VII, 1859, p. 19.



UNGAINLY, PERHAPS, BUT IT CAN FLY

This is one of several attitudes of the Ward heron recorded by the author's camera at Brevard Island.



AN AMERICAN EGRET STANDS BY ITS NEST AT ORANGE LAKE

Plume hunters threatened these birds with extinction, but Federal protection saved them, and they are now slowly increasing.



A WARD HERON SAILED LIKE A KITE



IT LEFT ITS PERCH ON A MANGROVE



AT REST IT LOOKED HEAVY

The Florida form of this great blue heron, which the author photographed at Mosquito Lagoon, is a much paler bird than its relative of the Northern States in summer.

herons, and my observations have convinced me that the fish crow is responsible. At the time the decrease of the herons was noted a definite increase in the number of fish crows was also observed along the river and in the surrounding district.

In front of our cottage fish crows became daily visitors, usually occupying vantage points of the tops of several yellow pines growing there. Then, before the cottagers were astir in the morning, the crows would visit the feeding boxes for food intended for other birds.

For many years the crows came to the boxes in small numbers, but in more recent times as many as 40 or 50 would appear at a time, blackening the tops of the pines. Elsewhere along the river they increased from straggling small parties to flocks not uncommonly containing hundreds, all busily engaged in satisfying their hunger.

These black-garbed robbers have been known to be persistent enemies of breeding herons in Florida, as well as elsewhere in their range. In a preceding chapter I have recorded the depredations of these crows among the breeding herons, clapper rails, and other birds at Revels Island, Virginia.

That they destroyed the heron rookeries on the Halifax River is rendered certain also by the fact that the crows increased to a maximum in the period when the herons were most numerous. As they have gone, the crows have decreased greatly in number.

A FEATHERED TOLL GATHERER WAS "OLD BILL" THE HERON

A Florida great blue heron (*Ardea herodias wardi*), known personally as "Old Bill," has for many years passed most of each day on the roadway near the middle of the Port Orange toll bridge over the Halifax River. He is a fine, big, dignified bird, and his friendly confidence in his human neighbors is so appreciated that he is a well-known local character.

Old Bill always has an aristocratic air of aloofness and pays little attention to the public notice he attracts. Pedestrians may approach him slowly within a few yards without exciting his alarm, and when vehicles pass, he merely hops upon the bridge railing.

The increase of automobile traffic, however, is forcing him to avoid the roadway much more than formerly. When not on the bridge, he may usually be seen a few yards above it on a shallow bar.



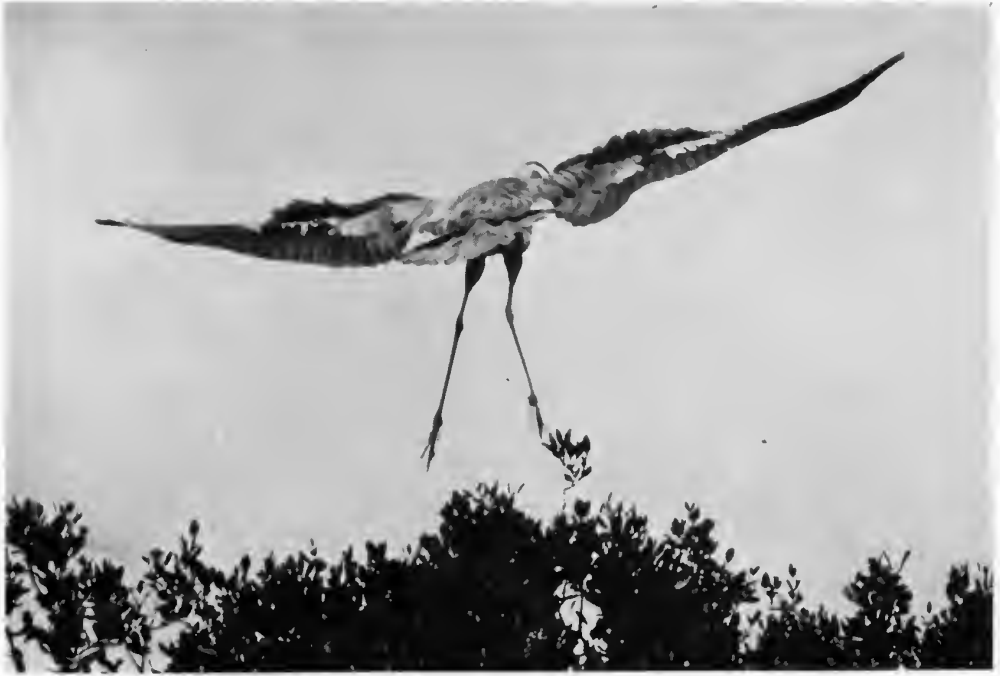
LOUISIANA HERONS VISIT IN ANOTHER STATE

These birds are common residents throughout the year in eastern Florida, where they haunt retired shallow waters in which food is available.



IN FLORIDA THE LOUISIANA HERON IS BECOMING SCARCE

In the last 15 years these birds have decreased vastly in numbers because of the destructiveness of fish crows. The enemies are less numerous because of their absence (see text, page 176).



THE WING SPREAD IS IMMENSE

In flight the Ward heron presents some strange pictures with its long legs adangle and its huge wings outspread.



ITS FEET ARE LIKE KITE TAILS

With such enormous wings, the Ward heron need not worry about minor details of flying form, but it will never win renown for grace.



TWO ALERT BLUE JAYS MAKE A DISCOVERY IN FLORIDA

This pair, in searching for grain, discovered a partly concealed camera only a few yards away and expressed their distrust by elevating their crests.

Old Bill's presence on the bridge is not from any desire for a place in the public eye, but for a much more prosaic purpose. During most of the daylight hours the railings of the bridge are occupied by scattered fishermen, their interest centered on the water below. Whenever one of them drops his catch on the bridge, Old Bill watches his opportunity to step silently forward.

With a flip of his big beak he seizes and casts the smaller-sized fish into the water. He then flies down, and, wading up to the floater, proceeds to send it down his long neck. Herons will not try to swallow a dry fish, but must have it wet so that it will go down easily. One fisherman complained that Old Bill had robbed him of eight fish in one day.

Old Bill's confidence in humanity, so unusual in birds ordinarily shy and suspicious, originated in the friendly advances of a bridge tender, who encouraged and winked at his protégé's flagrant violations of property rights.

In addition to the friendly little owls about our Florida home was another bird of the night which proved equally interesting to the members of our household. This

was the chuck-will's-widow, belonging to the goatsucker family and somewhat larger and browner than its northerly relative, the whip-poor-will. The difference in names "expresses the syllabic differences in their calls" (see illustrations, pp. 84 and 85).

The chuck-will's-widow comes from lower Florida in late March, immediately making its presence known by the tribal slogan. As the mating season approaches, its limited vocabulary finds expression in an almost uninterrupted serenade for man or mate, with a slight variation in intonation.

It is the one bird that, when casually observed, apparently has no feet, for it lies flat on the ground or crouches low on a limb until taking flight, when, doubtless, the concealed feet and legs help in the take-off.

"SHINING" THE CHUCK-WILL'S-WIDOW

One warm night in the middle of April, 1935, we had an interesting experience while motoring along a well-wooded road near the Halifax River. We had gone only a short distance when we saw, some 200 feet ahead, a chuck-will's-widow. Coming nearer, we could see this bird plainly. It was crouching on the roadway, its bright

eyes glittering until it was flushed a few yards away. Its eyes were in marked contrast to the eyes of certain animals, which fade away when the bodies become plain.

Before returning late in the evening, we saw about a dozen of these birds. Secluded roads seemed to serve as flightways for the chuck-will's-widow, where betwixt the bordering trees the broad-mouthed hunters of the night had little trouble in catching the different species of winged insects.

More than twenty years before, I had discovered that both the large and the small species of the goatsucker in the Panama Canal Zone had eyes that readily reflected the rays of electric lamps strung along the edge of the barracks in which we stayed. Doubtless these lights attracted insects and gave the southern relatives of the chuck-will's-widow an equally favorable feeding place. But it was not until the present

writing that I personally noticed in Florida or any of our other States a nocturnal bird that had glowing eyes.

A recent inquiry shows that many auto drivers had occasionally seen eyes shining along rural roadways but attributed the same to such animals as the raccoon and the rabbit. I have little doubt that in a majority of these cases the eyes seen were those of the chuck-will's-widow, for there are few persons, even among ornithologists, who know that there is any species of bird having eyes that shine at night under suitable conditions (see Volume I, Chapter XXIII).

These little trips recalled the earlier times, when, in a canoe, I went out after dark to "shine" deer with a gun at my side, and the later period when the camera and flashlight afforded a less destructive pastime in studying wild animals in their midnight rambles.



FLORIDA SCENERY ENTICES TRAVEL UP THE HALIFAX RIVER—EASTERN SIDE

The heavy draping of Spanish moss on the oak trees along the river gives a singular charm to woodland vistas there as well as in many other parts of the State.



CHAPTER VIII — PART I

Further Experiences Among the Wild Life of Florida

LATE in April, 1903, while on an expedition to the great Green Swamp to photograph sandhill cranes, I visited the town of Taveras, a little south of Sanford. In the midst of the place was a large, nearly completed opera house, which had been built just before a disastrous winter when the surrounding orange groves were destroyed by a hard freeze.

For some years the building had stood with gaping doors and windows. It had become the resort of thousands of bats, which secreted themselves by day under the roof and in the unplastered walls. Every evening at dusk the bats, undoubtedly the free-tailed species of this region (*Tadarida cynocephala*), poured forth from the upper windows and chimneys like a cloud of smoke, and dispersed over the surrounding country on their nightly hunt for insects. They always returned before daybreak.

BATS MAKE AN OPERA HOUSE PAY

So great were the numbers of these bats that the owners found it profitable to gather and sell the droppings, which are valuable as a fertilizer. From this source they obtained some hundreds of dollars each year, the only income from the opera house.

These bats are close relatives of the Mexican free-tailed bat, a species that is abundant in southern Texas and that has been exploited about San Antonio as a supposed controller of malarial mosquitoes. There a number of especially constructed bat roosts have been built, but so far as I have learned only one of them has been occupied by the bats.

Microscopic examinations of the stomach contents and droppings of these bats have failed to show that mosquitoes form any considerable part of their food. Furthermore, it is well known that malaria is prevalent in many localities in Texas and Mexico that are frequented by tens of thousands of these animals, another fact that puts into question their efficacy as mosquito destroyers. The free-tailed bats of our southern border and the tropics gather to roost in enormous numbers in great limestone caves, especially in Texas and in the Carlsbad Cavern, New Mexico.

The swamp rabbit of Florida and the coastal swamps and marshes of adjacent States swims nearly as well as a mink or a muskrat. Though similar in general appearance to the cottontail of the North, it is a heavier-bodied, shorter-legged, darker-brown animal, with slender, long-clawed feet and a much smaller tail. It lives in grassy marshes or in wooded and brush-grown swamps.

When small vegetation, such as grass or reeds, forms a dense growth, these curious rabbits make well-worn runways, which they use constantly. They habitually leave the roads and voluntarily take to the water or, when frightened, cross waterways with the utmost facility. The partial webbing between the hind toes helps make them expert in the water.

For several hundred yards up and down the shore of Halifax River in front of my winter home, a fringe of reeds, swamp grass, and water-loving brush grew both in and out of the water. On the bank were palmettos. The rabbits constantly frequented this cover. When pursued by stray dogs, they swam out among the reeds and quietly lay totally submerged, except for their noses, until the enemy had departed.

For years I had seen the runways of the rabbits in this nearby growth, but because of the abundance of their native food in these haunts, it was doubtful for a long time whether they would invade our garden. One evening at dusk, however, I saw a pair at the foot of the little slope near the river. Encouraged by this evidence of their neighborliness, I placed some celery and carrots near the water.

PHOTOGRAPHING SWAMP RABBITS

The next morning, I was delighted to find that these offerings had vanished; for it indicated that swamp rabbits, like cotton-tails, have a taste for garden truck. I set a camera and flashlight, with a baited pull string. Early the following night the flashlight suddenly illuminated our living room and the loud report of the explosion caused much excitement in the nearby cottages. The photograph that resulted showed a swamp rabbit feasting on the bait at the end of the string. On subsequent nights I



A YOUNG NIGHT HERON DISPLAYED TEMPER

This protesting youngster provided one of the few photographs that rewarded the author's visit to middle Florida.

had no difficulty in taking, all practically in my front yard, a series of pictures of these nocturnal animals in several different attitudes.

GRAY SQUIRRELS BECOME NUISANCES AT THE BIRD FEEDING PLACES

The gray squirrels, too, were regular boarders. Although we did not begrudge them the food, they became a great nuisance and drove away other visitors. They had the habit of sitting frequently on a feeding platform for half an hour. When one retired another would take its place to the exclusion of all birds during this time.

To prevent this monopoly, I covered with smooth tin the wooden stake supporting the

platform to keep the squirrels from climbing it. This plan worked very well for a while, but the animals soon learned that they could reach the feeding box by dropping upon it from overhanging limbs. Then I tried the device of hanging the platform suspended from two guy wires midway between the porch railing and the trunk of an oak tree, but the squirrels promptly overcame this difficulty. The wires were too small for them to use for a "tight rope," but soon they were descending from the tree trunk, using all four feet hand over hand along the wires, their bodies hanging below.

TAKING A WILDCAT PICTURE

Besides the bears, there was another animal that foiled me. It was the wildcat, a southern cousin of the Canada lynx. I had once succeeded in getting a flashlight

picture of the lynx in western Ontario (see Volume I, page 150), but the wildcat had eluded my every effort to photograph it.

For putting out bait around the edges of swamps and thickets near the Florida coast, where wildcats were abundant, the only rewards I got were pictures of raccoons, skunks, opossums, and roof rats. Finally I heard of a raid made on a chicken coop at a plantation up the Halifax River, where 40 out of 45 chickens had been killed by wildcats.

Visiting this place, I borrowed one of the surviving fowls and placed it in a box, well guarded on the open side by a strong wire mesh, with enough food and water to last several days. I nailed the box to a



A YOUNG SANDHILL CRANE GOES WADING

These birds are resident in large marshy plains in middle and northern Florida. They were once very numerous there but now exist in only a few localities.



FLOWERS SURROUND THE NEST OF A LOGGERHEAD SHRIKE NEAR SANFORD, FLORIDA



FLORIDA SWAMP RABBITS TOOK THEIR OWN PICTURES FREELY BY FLASHLIGHT

When pursued, these rabbits take to the water and swim as freely as muskrats. The Florida form is dark reddish-brown. The tail is very short, with only a little white on the underside.

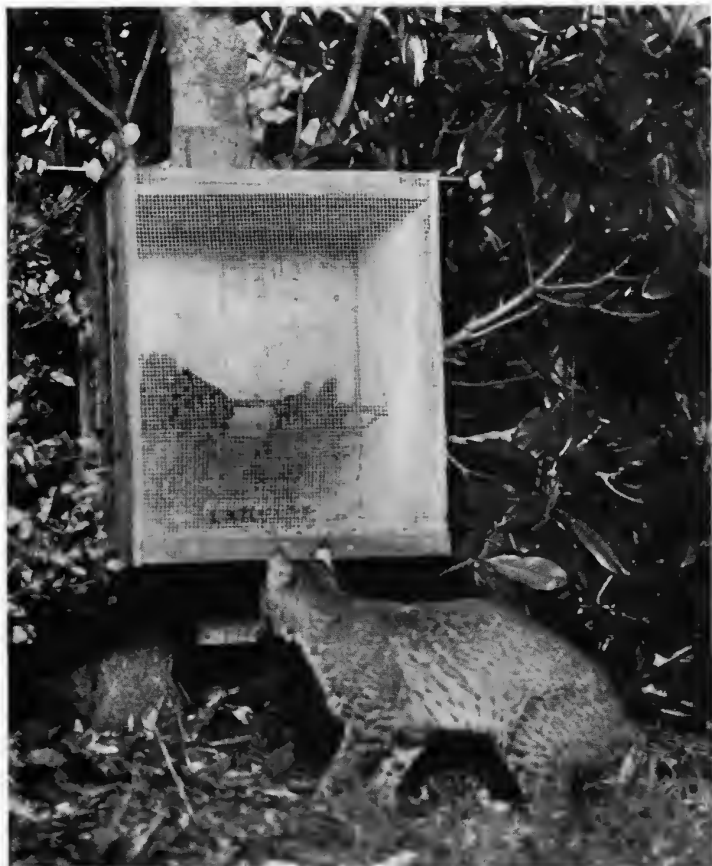


FLORIDA SWAMP RABBITS ARE SELDOM SEEN IN DAYLIGHT



IT APPRECIATES A LITTLE ASSISTANCE

Gray squirrels are common residents about the author's winter home at Ormond Beach. They enjoy orange juice when the fruit has been cut, but apparently do not open the skin themselves.



THE AUTHOR PHOTOGRAPHED ONLY ONE WILDCAT

Success was attained by an odd combination of an automatic flashlight with broad daylight, at a plantation up the Halifax River from Ormond. The lure used was a live chicken in a screened box (see text, page 182).



"THE SAME OLD COON"—ONLY A LITTLE WILIER

Disturbed by an explosion on a former night, this animal on the next visit came to the bait from behind with the idea, perhaps, of being screened from the dazzling flash.



THE FLORIDA RACCOON IS AT HOME AMONG THE PALMETTOS AND TRAILING SPANISH MOSS

Near the author's winter home, at Ormond Beach, a number of raccoons have taken their own pictures by the automatic flashlight camera. When young, this animal makes an interesting but inquisitive pet. It is practically omnivorous, eating frogs, fish, small mammals, birds, eggs, insects, fruit, young corn, etc.



A LITTLE GRAY SQUIRREL SITS FOR HIS PICTURE



A FLORIDA RACCOON TAKES HIS OWN PHOTOGRAPH

These animals feared neither the flashlight nor slumbering people when they were seeking a meal within an orange grove at Ormond Beach.



FOURTEEN SKUNK FLASHLIGHTS WERE OBTAINED IN TEN DAYS



VISITORS WERE OF MANY SORTS

An almost black skunk took his own picture at the same place where the raccoons, the opossum, and the cat were also photographed.



A VIRGINIAN THRIVES IN FLORIDA

Opossums are the only American marsupial. Their young are born in an embryonic condition and are attached to teats in a pouch on the mother's abdomen.



THE COTTON RAT IS A SLY CREATURE

Like the swamp rabbit, this little rodent makes its runways in the damp ground covered with heavy grass and reeds along the Halifax River.



ANOTHER FLORIDA OPOSSUM TAKES ITS OWN PORTRAIT

These animals were common about Ormond, along the Halifax River, though because of their nocturnal habits few visitors know of their presence.

magnolia tree in an abandoned orange grove near the thicket where the slaughtered chickens had been dragged.

Every few days I went to the place to care for my "decoy" chicken and to see whether the flash had been fired. After ten days I returned again to the plantation to get the camera.

The owner of the place met me with an apology, saying that on the day before he had let his big boar out of the pen for an airing. It had been shut up all the time I had been trying for a picture. The boar had gone unseen to the rear grove and evi-

dently had fired the flash, for there had been a loud explosion.

On looking up the trail, he had seen the boar return at full speed with head and tail up to the shelter of its pen. It seemed to have had all the fresh air it desired. I told the gentleman that I should be glad to develop the plate.

It was some time after I returned before the plate was developed. In it, instead of the big hog, appeared the crouching form of a wildcat! Most amazing is the fact that the picture was taken in bright daylight, so that it represents a combination of



NIGHT CUSTOMERS TAKE GRAIN INTENDED FOR OTHERS

Roof rats, usually house frequenters, occur wild in great numbers throughout most of Florida. At Ormond Beach these agile climbers, old and young, nightly eat the food placed for birds.



A TOMCAT ON A HUNT FIRES FLASH SET FOR RABBITS

No animals more destructive to birds and small game exist than stray cats, for they possess all the cunning of their wild ancestors and much more, acquired through domestication. This fellow caused the author some annoyance by firing flashlights set for other creatures.

daylight and flashlight exposure (see page 186).

Among the many interesting animals in Florida is the cayman, sometimes called the American crocodile. It was first recorded in Florida by Rafinesque in 1822. The next time it was observed by a naturalist in the State was in 1869 at Biscayne Bay, when Dr. Jeffries Wyman collected specimens which are now in the Museum of Comparative Zoology, Cambridge. Since then it has been found to inhabit the salt lagoons and marshes of extreme southern Florida and the adjacent keys, to which section it is restricted because of the absence of frost, to which it is very sensitive.

THE CAYMAN AND THE ALLIGATOR

The cayman is the largest of the lizards in North America, sometimes exceeding 15 feet in length. It occurs also in the tropical lowlands of the West Indies, Mexico, and Central America. In recent years its numbers in Florida have greatly decreased, although it appears to be harmless there so far as human beings are concerned. This American relative of the dreaded Old World crocodile is readily distinguished from the well-known alligator by its long narrow snout, as contrasted with the broad, rounded, shovel-shaped nose of the alligator.

When I first went to Florida, the alligator was abundant in most parts of the State, frequenting the fresh-water streams, shallow lakes, and marshes and tidal lagoons. The increasing demand for its hide, from which ornamental leather goods are made, has greatly reduced its numbers. This decrease has been hastened by the fact that very young ones find a ready sale to tourists. The man with a gun also has helped to lessen the numbers of alligators by thoughtlessly killing them just because they serve as large living targets.

The mouth of the Tomoka River, a tributary of the Halifax, is about 6 miles above my winter home. This stream is navigable by large power boats for about 10 miles above its mouth, which is in the midst of broad, grass-grown marshes, with stately groups of tree palmettos here and there along the adjacent higher ground. Narrow, winding, and sluggish, the river is a favorite resort for picnic parties in launches and other excursion boats.

Farther up, the marshes are more broken by wooded areas, where palmettos, pines,

and live oaks are intermingled in picturesque array. The upper reaches of the Tomoka are narrow and heavily fringed with trees, including the live oaks, which are beautifully draped with Spanish-moss, its hanging strands sometimes 12 to 15 feet long. The marshy borders of this river have long been a favored haunt of alligators; and by common consent, because of their interest to visitors, they have had there a certain degree of protection.

During my first trip up the Tomoka, in an excursion boat with many other passengers, I saw many alligators large and small lying in the sun near the water's edge. Whenever an unusually large one was seen, the boat would swing over and pass close to the apparently sleeping animal without causing any sign of alarm from it, even when the excited passengers made loud cries and rushed across the deck of the boat to get a better view.

This indifference on the part of the alligators made me feel sure that a brief visit to the river in a rowboat would afford many opportunities to take photographs of them. In a small boat with John at the oars, I made a 20-mile round trip, which recalled our long hunting and fishing excursions along the shores of Lake Superior.

As we carefully rounded the first point in the marsh, we saw about half a dozen alligators lying on the muddy shore. They saw us at once, too; and as the boat came into the line of their vision, they all promptly slid into the water, some splashing a little. This unexpected wariness continued among them all the way up the river, and we were unable to take any photographs.

TOMOKA RIVER ALLIGATORS WERE WARY OF SMALL BOATS

It was plain that the alligators had learned that the passing of the large boats with many passengers was of no concern, but that the appearance of small craft meant possible danger. Afterward I invited a party to accompany me up the river on the large boat, and from its deck had no difficulty in obtaining a good series of pictures. Every time the boat was backed up to try for a second picture, the alligators became suspicious and disappeared.

Many years ago when I went to the Big Green Swamp, south of Mohawk, Florida, to take pictures of the rapidly decreasing Florida sandhill crane, a local trapper took me to a marsh where he said these birds



PORPOISES DISPORT THEMSELVES IN PONCE DE LEON INLET

These mammals range freely into the inlet after fish. They sometimes show curiosity in regard to a person along shore and raise their heads high enough to get a free view with one eye. The one to the right is gazing at the photographer.



ALLIGATORS BASK LAZILY ON THE TOMOKA RIVER

These reptiles may be at once distinguished from their relative, the cayman, found farther south in Florida, by their broad, rounded, shovel-shaped snouts (see text, page 193).



TOMOKA RIVER WAS ALLIGATOR TERRITORY

Sailing along this stream, the author saw many of the huge reptiles sunning themselves. When approached for camera "close-ups," however, they slid into the stream (see text, page 193).



IT WENT OUT OF SIGHT IN THE WATER, A MOMENT LATER

On a trip along Tomoka River the author had indifferent success in attempts to photograph alligators. This reptile was caught by a snapshot just as he was taking to the water.



IT LOLS ON A LOG IN THE TOMOKA RIVER

Alligator mississippiensis is a sluggish fellow ordinarily, but he can cause havoc when aroused. Strange as it may seem, his most dangerous weapon is his tail, not the teeth in his huge jaws.

were nesting. On arriving, we found all the nests empty. The guide said this condition might be due to his collecting the eggs and sending them north at the rate of a dollar apiece. His explanation, indeed, threw some light on the rapid disappearance of the bird in this locality.

Desiring to mollify me, he told of a little pond nearby, where I could get a picture of "the biggest alligator in Florida." Approaching the place cautiously, I saw what seemed to be a small alligator wriggling its way through the tall grass to the pond. Reaching down, I seized it in the middle and held it aloft.

To the horror of the guide and me, it proved to be an extraordinarily large water moccasin!

Meanwhile the snake was trying to swing its head up so that it could strike my wrist, the nearest part of my body, and a spot where the poison would be particularly dangerous. Of course, I dropped it at once, and was glad that this reptile had lived up to its reputation for sluggishness. Few persons are killed or injured by the many thousands of moccasins occupying the southern swamps.

The Everglades and Kissimmee Prairie, north and west of Lake Okeechobee, and the surrounding region have long been noted for the huge size of the rattlesnakes living among the grasses and other low vegetation of these open plains. Formerly, specimens more than six feet long were not uncommon, but in recent years with the coming of many people their numbers have so decreased that even a naturalist would have difficulty in finding one so large.

FLORIDA RATTLESNAKES

The ordinary visitor to the State is not likely even to get a glimpse of the moccasin or of the rattlesnake. While we were camping at the edge of the swamp, I took photographs of two half-grown night herons, the first pictures I had obtained of this bird. Another trophy obtained here was the skin of a rattlesnake more than six feet long, with 12 rattles. It long adorned the living room of my hunting cottage at Revels Island.

In my many years in the southeast, I never saw more than half a dozen rattlesnakes, or until lately heard of one that measured more than 8 feet 2 inches. The



THIS SPECIES IS KNOWN LOCALLY AS THE FLORIDA GOPHER

The large land tortoise (*Gopherus polyphemus*) occurs in most of the dryer parts of the State. It lives in burrows which it digs in sandy soil. There it hibernates during most of the winter.

experience of my old hunting companion, Prescott Ely, had been similar during the nearly 40 winters he had passed in Florida and adjoining States. He has recently sent me a photograph of a diamond-back rattler killed south of Palm Beach. It is said to measure more than 8 feet 6 inches, though there seems to be no authentic case of a rattler exceeding 8 feet 4 inches, according to Dr. Ditmars of the New York Zoo.

Many timid persons hesitate to venture on foot into wild places, whatever the character of the snakes. Very few of our land snakes in North America are poisonous, and the rattler, most numerous of the venomous few, usually coils before striking, first giving a distinct warning with its rattle.

It is generally believed that most of the snakes in the South have been killed by razor-back hogs and deer, or by the increasing number of hunters. The drivers of automobiles that now travel most roads are alert in running down most snakes, especially the rattler. Many of these reptiles are harmless and work a practical benefit to man by destroying field mice and other small rodents. They should,

therefore, be regarded with greater toleration.

James A. Groover, of Ormond, an old and lifelong resident of the Halifax River section, gave me in May, 1931, some reminiscences of conditions there between 1850 and 1870, when this region was a wilderness. The last vestiges of earlier English plantations had disappeared, and the cutting of live-oak logs along the river and shipping them through the inlet were the only occupations.

EARLY DAYS ON THE TOMOKA

The few settlers led extremely primitive lives. They occupied rude log houses, and depended for their subsistence almost wholly upon game and the products of little farms. Their clothing was made from cotton raised, spun, and woven by hand. The few necessities that could not be produced on the farms were obtained at the nearest trading station, 35 miles away, on the St. Johns River.

Deer, plentiful in the Tomoka woods, gunners shot at night by shining their eyes with the light from a fire of pitch pine in a frying pan, a device I found in use among



DRIVEN FROM SHELTER, HE GLARES AT THE WORLD

Routed from its retreat among leaves and Spanish moss, this little screech owl sits blinking in the sun. Many persons formerly believed his species harmless to other birds, but investigation proved that it is destructive to several small kinds.



HAVING FUN WITH A LOGGERHEAD (*Caretta caretta*)

Every spring both this species and the green turtle come ashore and, scooping holes in the sand above high tide, deposit large clutches of eggs, which they bury by using their front flippers. Then the mothers depart. In due course the little turtles appear, enter the sea, and swim away.



THE SLUGGISH LAND TURTLE, OR FLORIDA "GOPHER," PROVED NERVOUS

As this fellow emerged from his winter hibernation he pressed against the set string and photographed himself. He was so alarmed by the explosion of the flashlight that he retired into his den and remained there for days afterward (see Volume I, page 73).



THIS WEB-FOOTED AVIATOR IS AN AMPHIBIAN

The snake bird was once abundant in Florida and may now be found in many places, but it appears to be steadily decreasing in numbers.



THE GREEN SEA TURTLE IS A GOOD NATATOR

These famous providers of the material for soup are common in Florida waters. When the young hatch, they dig up through the sand in which the eggs are buried and with unerring instinct proceed to the water and swim away.



ONE WOULD HARDLY VENTURE TO TOUCH IT ALIVE

This extraordinarily large diamond-back rattlesnake, killed south of Palm Beach, Florida, about 1923, was estimated to measure more than 8 feet 6 inches (see page 196).

the Ojibway Indians during my boyhood days in northern Michigan. Wild turkeys were all about and gobbled in reply to the crowing roosters around the house. At night black bears sometimes tried to capture one of the hogs under the house, which was built well above the ground, and panthers, or mountain lions, as they are called in the West, wandered fearlessly about the vicinity.

AUDUBON VISITS THE HALIFAX RIVER COUNTRY

Several winters ago there was brought to me at Ormond Beach a copy of a little-known letter by the famous artist-naturalist, John James Audubon. It describes a visit he made long ago to this river and the adjacent country, and gives an account of several days of his experiences. It affords such a good picture of the primitive conditions prevailing there a hundred years ago that parts of it are here included. It was written to the editor of the *American Monthly Journal of Geology* at Philadelphia. Audubon, of course, was interested in the bird life, especially the brown pelican, which then as now was a conspicuous inhabitant of this coast.

"Bulowville, Florida,
"Dec. 31st, 1831.

"My dear F.:

"I have just returned from an expedition down the Halifax River, about 40 miles from this place and 80 miles south of St. Augustine. I feel confident that an account of it will be interesting and I therefore set to:—

"Mr. J. J. Bulow, a rich planter, at whose house myself and party have been for a whole week under the most hospitable

and welcome treatment that could possibly be expected, proposed three days since that we should proceed down the river in search of new and valuable birds, and accordingly the boat, six hands, and three white men with some provisions put off with fair wind and pure sky.

"We meandered down a creek for about 11 miles, the water nearly torpid, yet clear, the shore lined with thousands of acres, covered by tall grasses, marshes, and high palm trees rendering the shore quite novel to my anxious eye. Some birds were shot and brought back for the skinning operation. Before long we entered the Halifax River, an inland arm of the sea measuring in breadth from a quarter to nearly a mile. * * *

"We passed several plantations on the western bank, and at last reached a schooner from New York, anchored at what is called a live oak landing. Kindly received by the master and his men, we passed the night very agreeably and comfortably as circumstances would permit.

"At sunrise the next morning I and four negro servants proceeded in search of birds and adventure. The fact is, I was anxious to kill some 25 brown pelicans to enable me to make a new drawing of an adult male bird, and to preserve the dresses of the others. * * *

"My generous host proposed to turn toward home again. Preparations were made accordingly, and we left the schooner again with the tide and wind in our teeth, and with prospects of a severe cold night. Our hands pulled well and our bark was as light as our hearts. All went on merrily until dark night came on. The wind freshening, the cold augmenting, the waters lowering, all depreciating except our enter-



THE FLORIDA CORMORANT ADAPTS ITSELF
TO CHANGE

These birds commonly use channel markers along the Halifax and Indian rivers as perches.



WHITE GANNETS VISIT DAYTONA BEACH

They winter in considerable numbers off the coast of Florida, and breed on rocky islands from near the mouth of the St. Lawrence River to the coast of Great Britain.

prising dispositions, we found ourselves fast in the mud about 300 yards from a marshy shore, without the least hope of being able to raise a fire, for no trees except palm trees were near, and the Grand Diabie himself could not burn one of them. * * *

"Our only resort was to leap into the mire waist deep and push the bark to a point some 500 or 600 yards distant where a few scrubby trees seemed to have grown to save our lives on this occasion.

"'Push boys, push for your lives,' cried the generous Bulow and the poor Audubon, 'all hands push.'

"Aye, and well might we push, the mire was up to our breasts, our limbs becoming stiffened and almost useless at every step we took. * * * It took us two and a half hours to reach the point where the few trees of which I have spoken were, but we did get there.

"We landed, and it was well that we did, for on reaching the margin of the marsh two of the negroes fell down in the mud as senseless as torpidity ever rendered an alligator or a snake, and had we white men not been there they certainly would have died. We had them carried to the grove, to which I believe all owe our lives.

"I struck a fire and in a few minutes I saw with indescribable pleasure the bright, warming blaze of the log pile in the center of our shivering party. We wrapped the negroes in their blankets, boiled some water, and soon had some tea. We made them swallow the tea and with care revived them.

EARLY HARDSHIPS IN FLORIDA

"May God preserve you from ever being in the condition of our party at this moment, scarcely a man able to stand, and the wind blowing as keenly as ever. Our men, however, gradually revived, the trees one after another fell under the hatchet and increased our fire, and in two hours I had the pleasure of seeing cheerful faces again.

"All hands returned alive; refreshments and good care have made us all well again, except for the stiffness occasioned in my left leg by nearly six weeks' wading through the vilest thickets of scrubby live oaks and palmettos that appear to be created for no purpose but to punish us for our sins, thickets that can be matched only in the cantos of your favorite, Dante.

"To give you an account of the little I have seen of East Florida would fill a volume, and therefore I will not attempt it just now, but I will draw a slight sketch of part of it. The land, if land it can be called, is generally so sandy that nothing can be raised upon it. The swamps are the only spots that afford a fair chance for cultivation; the swamps, then, are the only places where plantations can be found.

"These plantations are even few in number. Along the East Coast from St. Augustine to Cape Canaveral there are about

a dozen, and these, with the exception of two or three, are still young plantations. Gen. Hernandez', J. J. Bulow's, and Mr. Durham's (Dummitt's probably) are the strongest and perhaps the best. Sugar cane will prosper and perhaps do well, but the labor necessary to produce a good crop is great, great, great.

"Between the swamps of which I speak and which are found along the margin lying west of the sea inlet that divides the mainland from the Atlantic to the river St. John, of the interior of the peninsula, nothing exists but barren pine lands, poor timber and immense savannahs, mostly overflowed and all unfit for cultivation. That growth which in any other country is called undergrowth scarcely exists, the land being covered with low palmettos or very low, thickly branched oaks, almost impenetrable to man.

"The climate is of a most unsettled nature, at least at this season. The thermometer has made leaps of from 30 to 90 degrees in 24 hours; cold, warm, sandy, muddy, watery, all these varieties may be felt and seen in one day's traveling.

AUDUBON MISJUDGED POSSIBILITIES IN EASTERN FLORIDA

"I am extremely disappointed in this portion of Florida and would not advise anyone to visit it, because he may have read the flowery accounts of preceding travelers. The climate is much more unsteady than that of Louisiana, in the same latitude, or anywhere along the Mexican Gulf to the Sabine River, which is our boundary line. Game and fish, it is true, are abundant, but the body of valuable, tillable land is too small to enable the peninsula ever to become a rich State. * * *

"And now, my dear F., adieu. In my next I hope to give you some account of St. John's river and of the interior of the peninsula of East Florida, to the exploring of which I mean to devote some time.

"Very faithfully yours,

"JOHN JAMES AUDUBON."

This letter is particularly interesting today in view of Audubon's gloomy view of the future of eastern Florida, especially his prediction that it would never invite settlement except on a few plantations near the swamps. If he could return now, he would be confronted by many modern miracles. There in that very region his hope-



A SCREECH OWL IS AT HOME IN A
NESTING BOX

This comical looking little bird has a voice out of proportion to its size.



SCREECH OWLS LIKE THIS TIDBIT

Unlike its neighbor, the chameleon, this thin, dark, long-tailed lizard, is unable to change its color. The birds at first dismember it for their young and later teach the fledglings to eat it alive.

less wilderness has given way to many thriving towns, beautiful winter homes, great hotels, vast areas of citrus groves, and even greater stretches of farms supplying all kinds of winter vegetables to northern cities.

I have already recorded the intense interest that primitive islands, with their natural beauties and varied wild life, have always held for me. When in later years



TURKEY BUZZARDS TAKE WING

Note the large fish placed on shore. It served effectively as bait to lure the voracious birds into range of the camera.



THE GRAY KINGBIRD

In the Bermudas and many of the West Indies our common flycatcher is replaced by this species which ranges in summer to southern States.

I visited a long succession of islands ranging from the subarctics of both coasts down to Panama, I became enthralled by the attractiveness of these little worlds in the midst of broad waters.

Early in 1910 I was invited by Dr. R. V. Pierce, of Buffalo, N. Y., to visit him at his winter home on St. Vincent Island, near Apalachicola, northwestern Florida. Doctor Pierce did not use a gun on his little domain, and he not only fostered the native wild life but also had introduced the European red deer, the English pheasant, and some other game birds.

A PRIVATE GAME SANCTUARY

The native wild life included the white-tailed deer and the smaller mammals, as well as the birds of that region. Also, occasional wild hogs and cattle could be seen. The guardianship of the wild things on the island had been so successful that many of Doctor Pierce's friends visited him there in winter for the pleasure of seeing them.

In the middle of the island was a large lake with the outlet deepened to form a canal which passed Doctor Pierce's home.

This lake facilitated the study of the waterfowl by boat and the observation of the hundreds of alligators that sunned themselves along the stream and shores.

My host occupied a large, comfortable dwelling on the eastern end of the island, facing the Gulf, where a long dock provided shelter and accommodations for craft both large and small. In view of my projected trip to Mexico a few weeks later, my stay on St. Vincent was necessarily short.

The first afternoon, John Hammer and I set a mile or so from the house, several flashlight cameras fronting trails apparently used by deer, wild cattle, and other large and small creatures of the forest. From each camera a black thread led across the trail where it might be tripped by any passing large animal. On the ground other threads were left, baited to suit the taste of either meat eaters or vegetarians among the smaller species.

The first evening, sitting by an open fire in the living room, the Doctor and I talked on matters of mutual interest, especially concerning his efforts to naturalize here the red deer and several species of foreign



THE DRAKE IS A HANDSOME BUT UNGALLANT MATE

With some exceptions, these ducks are all male scaups, as indicated by the light backs and sides, and brilliantly black heads, compared with the drab coloring of the females. The drake's habit of consorting in flocks is even more marked in the early summer than in winter, for after incubation begins the males of most species permanently desert their mates, leaving to the latter the exacting duties of hatching and rearing the young.

game birds. Finally our talk was interrupted by the distant boom of the flashlight. The Doctor remarked that the explosion made a good deal of noise and wondered what effect it had on the animals firing it.

Continuing, he asked if a still heavier flash could be used. To this I replied that to do so would merely require the use of more powder, confined in a stronger receptacle to produce a report equal to that of a small-sized cannon. This information seemed to give him much satisfaction.

He told me that for some years he had been annoyed by poachers crossing to the island from the mainland and, by the use of headlights, killing many of his deer. Hoping to discourage this, he asked me to leave with him two of my flashlight machines arranged to fire a shotgun shell filled with flashlight powder, instead of the smaller charge for photographing.

He pictured vividly the surprise and terror of a poacher suddenly walking unconsciously into a string across the trail and firing a flashlight within a few feet. The dazzling light and a noise would almost stun the victim, and thus would probably end this man's invasion of the island.

THE AUTHOR'S FLASHLIGHT DEVICE A BURGLAR ALARM

My host was surprised when informed that many years before I had suggested this plan for frightening away unwanted intruders. Among the specifications submitted in the application for the patent granted me for the flashlight apparatus was the averment that immunity from theft and robbery might be secured by placing the device where it would be exploded by trespassers. They would be frightened into retreating before accomplishing their purpose. At the same time a concealed



A RED-BELLIED WOODPECKER EATS SUET ON A CABBAGE-PALM TRUNK

This, one of our common birds, heralds the approach of the mating season by hammering loud tattoos on tin roofs, metal tanks, wooden copings, and other sonorous objects. The author photographed it near his home at Ormond Beach.

camera would photograph the men and aid in their identification.

Although I left with Doctor Pierce the two flashlight mechanisms he requested, I never learned whether he succeeded in using them against his undesired visitors. Another guest, however, who visited the island a year later reported that he had heard the Doctor say he had finally got rid of the poachers.

The next morning a visit to the set cameras showed that their flashlights had been exploded. When developed, the

negatives taken here on the preceding and following nights showed that the visitors had been limited to raccoons, opossums, and razor-backed hogs.

This was the only locality where I have ever seen raccoons wandering about during the day. They had been unmolested here for so long that they were often seen patrolling the beaches in search of crabs or shellfish within easy reach.

RED DEER COULD NOT WITHSTAND THE ENVIRONMENT

The second afternoon I found the freshly shed antlers of a red deer—proof that some still survived. They finally all succumbed, however, not being able to withstand an unfavorable environment.

One day I had a talk with an old trapper who was camping by the lake. He confirmed the information I had previously received that the white-tailed deer on this island do not drop their fawns until the middle of

July, probably because of the better food supply at that time.

This trapper was employed to reduce the numbers of the alligators that were destroying both domestic and wild water birds, and the occupation was much to his liking. He passed part of the nights killing the alligators, using a jacklight to shine their eyes, and occupied much of the days in taking off their hides. These of course found a ready market among manufacturers of fancy leather goods. Thus the trapper realized double profit from his efforts.

CHAPTER VIII — PART II

Caught in a Hurricane—A Visit to the Bahama Islands

IN the spring of 1907 I had a welcome opportunity to go on the yacht *Physalia* of the Carnegie Institution, Washington, to visit the breeding colonies of boobies and man-o'-war birds of the Bahamas. The expedition was made doubly enjoyable by the companionship of Dr. A. G. Mayer, Director of the Dry Tortugas Marine Laboratory, in command, and Dr. Frank M. Chapman, of the American Museum of Natural History.

We sailed from Miami on March 28. The *Physalia* was a 56-foot ketch, with a 20-horse-power auxiliary engine, which had been generously placed at the disposal of Chapman and me for this voyage. At first our boat appeared small and low in the water for a thousand-mile trip among the Bahamas, but it proved seaworthy under most trying conditions.

It was a trim little craft with a graceful overhang in the bow and stern that reduced the keel measurement to only 25 feet. The draft was 5 feet and the main deck 3 feet above the waterline. The masts were disproportionately long and heavy, later proving a source of danger. The gasoline engine was for use in making difficult harbor entrances or to fight the treacherous tides of the Bahama Banks.

We made a smooth run to Cat Island, where we anchored for the night. The following morning we sailed for Nassau and

arrived there about midnight. The next day the local officials of this little British colony received us cordially and granted the permits necessary to enable us to visit the breeding places of the birds. We wished to take not only photographs, but specimens needed by Doctor Chapman.

It pleases me to record that the authorities of the Bahamas take real interest in the perpetuation of the local bird life, especially species such as the flamingoes, boobies, and man-o'-war birds that nest in colonies.



THE WIND SHIFTS

On the second night the *Physalia* anchored behind a small but sheltering reef, but at dusk the wind changed to an opposite direction, exposing the party to the fury of an ever-increasing gale (see text, page 209).



A FEMALE LESSER SCAUP SPURNS THE WATER IN A QUICK TAKE-OFF

This is the author's first flight picture of a duck. It was made on Mosquito Lagoon, Florida, in the winter of 1902. The difficulty in obtaining such photographs is due not so much to lack of lens speed as to the problem of focus.

The Bahama Islands form a broad chain, or rather belt, of islands, cays, rocky points, and reefs extending in a generally southeasterly to northwesterly direction. They lie to the southeast, and across the Gulf Stream, from southern Florida. The climate is mildly tropical, temperatures ranging from 66° to 88° Fahrenheit. The rainfall at Nassau is more than 60 inches.

Many of the smaller islands are barren, supporting a scanty growth of cactus, brush, or low trees and small plants, but some of the larger ones have luxuriant forests. The birds which we were intent on finding gain their subsistence from the sea and breed on the bare ground or bushy growth of rather sterile islets.

ANCHORED OFF NORMAN CAY

We left Nassau for Cay Verde, 230 miles away, on March 31. The day being perfectly calm, we used the gasoline engine and made about 40 miles, anchoring for the night off Norman Cay. Here a visit to the shore made us acquainted with several birds peculiar to these islands, including the beautiful honey creeper.

The next day, April 1, conditions changed, and a heavy head wind from the south hit us, displacing the customary easterly trade winds. For hours we tacked back and forth in a futile contest with the wind, but traveling to the windward was not the *Physalia's* strong point. At 4 p. m. we dropped anchor on the north side of Elbers Cay, a short, narrow reef which gave us excellent shelter from the thundering surf breaking on its windward side.

While we were enjoying our apparently safe berth for the night, a destructive hurricane struck Nassau to the north, and came roaring toward us. The barometer, however, had begun to fall and ominous thunder clouds were gathering overhead. Not liking the looks of the weather, we dropped a second anchor.

Within half an hour the wind abruptly changed to the north and, covering the sea with foaming white caps, threatened to cast us on the reef, which from a sheltering friend had become a threatening enemy. We hurriedly pulled up the anchors, the tumultuous waves nearly swamping us before the bow could be freed. For a time we were in deadly peril, but as the second anchor came aboard the yacht responded quickly to the helm.

As we passed clear of the cay we struck a hidden sand bar, however, and hung there long enough for a huge wave to sweep the decks and flood the engine room. It stopped the motor upon which we were relying to hold our course until a small sail could be raised.

The next wave carried us clear, and in a few minutes the engine was again running. Then began a struggle to clear some long, low coral-rimmed islands ahead which could be dimly seen in the gathering darkness. This required us to run at right angles to the gale, in the trough of the sea. Here it was that the big masts laid us over again and again, causing the lifeboats to be torn from the davits and wrecking things generally.

Darkness, accentuated by flashes of lightning, now came on. After a run of half an hour we hoped we had cleared the islands to the left, and turned the rapidly foundering yacht to run free before the wind. There followed an all-night's run through a network of coral reefs and shallow bars which for 600 miles form the easterly fringe of the Bahama Banks.

The night being impenetrably black no outlook was placed at the bow, but every minute or two the lead was thrown. When occasionally the Swede mate called out "Vun faddom," we knew that only a single foot of water lay between the keel and some jagged reef.

WITHOUT LIGHT IN A HOWLING GALE

At midnight the gasoline tank began leaking, and the little cabin was flooded with gallons of volatile oil. With a rush we extinguished all the lamps, including the binnacle light that illuminated the deck compass, just in time to prevent our sudden annihilation. The possession of a little electric pocket-lamp made it possible to see the wheelman's compass until, after an hour's effort, with a barricade of canned goods carried from the hold to the deck, we succeeded, despite the howling gale, in lighting a marine lantern.

At 4:30 a. m., in the first gleam of the coming light, the pilot made out a high, rocky island a quarter of a mile to the east, and in a few minutes he skillfully guided us into the narrow entrance of a shelter at Upper Gold Ring Cay, 91 miles from the anchorage of the night before, traveling under bare poles except a small jib to keep our steerage way.



CEDAR BIRDS HOLD CONCLAVE IN FLORIDA

During the spring migration they sometimes appeared in close flocks in the tops of low trees in the author's yard at Ormond Beach. After a short rest they would go on their way.



A FEMALE CARDINAL FINDS DISAPPOINTMENT IN FLORIDA

All the sunflower seed having been eaten by previous visitors, this one seems crestfallen, for the usual perkily erected topknot is not visible.



THE CRUSOE LIFE PROVED NOT SO BAD

After an experience with a hurricane the party landed on Gold Ring Cay, where an abandoned thatched hut gave welcome shelter (see text, page 209).



CURLY-TAILED LIZARDS ARE COMMON ON THE BAHAMAS

The twisty caudal appendages and quick movements of *Leiocephalus virens* give these little animals an amusingly jaunty air.



A ROBIN VISITOR FROM THE NORTH COMES
TO A WATER HOLE IN THE BAHAMAS



THE LITTLE GROUND DOVE IS A PERMA-
NENT RESIDENT OF THE BAHAMAS



A CAROLINA RAIL (ABOVE) AND A MYRTLE WARBLER MEET IN BAHAMA

The warm climate and abundance of food attract these visitors from the north. They are quenching their thirst at a water hole. The author found many species in the course of his sojourn here.

Here, in a spirit of thankfulness for our almost miraculous escape, we remained for two days, until the gale passed away, repairing the broken lifeboats and pumping out the gasoline from the bilge. We cooked our meals on shore, for the yacht was still filled with the sickening and dangerous fumes of gasoline.

How bright and lovely those scarred rocks and tangled thickets seemed! On board everything was thoroughly drenched, except our precious photographic plates, which fortunately had been put up in water-tight tin cans.

It may be remarked that this was the first hurricane at such an early date for nearly 20 years, and, with the wind blowing more than 80 miles an hour, it beached, sank, or dismantled many vessels at Nassau and in our vicinity, principally the small craft of negro spongers.

Let no inexperienced one suppose, however, that this adventure of the *Phy-salia* is typical of life on the sea, or that he who seeks the remote forests or the open waters is necessarily leading a life of excessive danger and hardship. The dangers of the crowded city far exceed in number and variety those of the former.

"The perils of the deep" is a most misleading phrase. It is the peril of the shallows, of the reefs, of the fog-bedimmed coast, that makes navigation sometimes dangerous and uncertain. Not too much



THEY WERE CAUGHT AWING BY DAYLIGHT

As these ring-billed gulls, an adult and a youngster, were dropping to some floating food, the author snapped his camera.



FLORIDA WOODPECKERS LIKE FRUIT

They were welcome to the oranges the author put out, but that did not suffice them and they stripped a Japanese plum tree near the porch. In the robbery they were assisted by some cousins of the downy species.

wind, however great, but too little water, is the cause of most disasters upon the sea.

The loss of all the gasoline except a few gallons remaining in the bottom of the ruptured tank delayed the expedition for many days, and instead of returning to Nassau within a week, we saw nearly a month elapse before the trip was over.

On April 4, well rested and with our confidence somewhat restored, we set sail



BOOBY AND MAN-O'-WAR COLONIES ARE USUALLY CLOSE TOGETHER

The latter are in the dark cactus thicket in the left foreground. They are pirates, obtaining much of their food from their stupid neighbors, without whom they probably could not live on this island of the Bahama group. The *Physalia* is at the edge of the surf.



THE WESTERN PART OF THE BOOBY COLONY WAS ON THE ELEVATED PORTION OF THE ISLAND

This strictly maritime bird is known as the white-bellied booby, a member of the gannet family, the ten species of which, with one exception, are tropical and subtropical. The white bird is the young and the black the adult.



BOOBIES IN FLIGHT SPREAD THEIR FAN-TAILS



THIS NESTING BOOBY DOES NOT HEED HER DISPLACED YOUNG



THE YOUNG BOOBY AT THE LEFT WEARS ITS FINAL GRAY



THE PARENT BOOBIES STAND GUARD, EXCEPT WHEN SEARCHING FOR FOOD



PARENT BOOBIES COVER THEIR YOUNG FROM THE DIRECT SUN

With the thermometer registering 130 degrees, such protection becomes necessary. This front view of the birds' faces presents convincing argument that the rather contemptuous name has some justification.



THESE WERE THE ONLY YOUNG TWIN BOOBIES NOTICED IN 700 NESTS

They are in their snowy vestments, only a bit of the darker color appearing in their wings and tails. The parent turns its head as if to listen to the conversation they seem to be carrying on in whispers.



MALE AND FEMALE MAN-O'-WAR BIRDS FLY OVER A SEA-GRAPE THICKET

Note their wing action and forked tails. The stroke of the one in front reminds the observer of the motion of a swimmer performing the Australian crawl. The female can be distinguished by its white breast.



A MAN-O'-WAR BIRD'S NEST ON CAY VERDE HOLDS ONE EGG

Woe to the boobies in their colony near by when the pirate is hatched from this egg. Its parents will feed it at sad cost to their stupid and defenseless neighbors; and as soon as it is large enough, it will steal for itself.



BOOBIES PERCH ON A CORAL CLIFF, 75 FEET ABOVE THE SEA, ONE OF THE HIGHEST IN THE BAHAMAS

The black gannet is a maritime bird found on both oceans, with a range on the Atlantic coast confined to tropical and subtropical America. It inhabits lonely islets and in flight resembles both the cormorant and the gull, but in fishing strikes the water at a low angle, emerging against the wind. The adult has a white breast, and the rest of the body is a soft, dark brown. The young are white at first, shading gradually into gray and the final brown of the parents. The feet are webbed, of yellowish hue; and the odd wedge-shaped bill is a green-yellow or a pink-yellow, according to sex.

for Ragged Island, about 100 miles farther south, the nearest inhabited place to our destination at Cay Verde, but out of sight of it. The yacht continued so permeated with gasoline fumes that those who wished to smoke were towed behind in our only serviceable boat. Being a confirmed smoker, I traveled for many miles in this fashion.

While at Ragged Island, we knew it would be difficult to make a landing on such an unsheltered place as Cay Verde. When the wind blew, the waves were too rough to risk landing in a small boat; and during a calm the lack of gasoline made it impracticable to travel much in search of good places on the beach. It was necessary for us to remain here until light winds prevailed, for our gasoline was about gone.

MANY BIRDS ON LITTLE RAGGED

In the course of our enforced delay we went ashore on Little Ragged Island, where we found some interesting birds, especially at a small pool of fresh water in a thicket where such different species as the myrtle warbler, Bahama ground dove, and Carolina rail gathered (see page 212).

Finally, on April 8, with a light head wind, the *Physalia* slowly tacked its way toward our goal, and late in the afternoon, when we were within three miles of this little island, the wind died out and it became necessary to use several gallons of the scanty remaining gasoline in order to make a landing before dark. A fortunate move it was, for the next day there prevailed a heavy wind that would have prevented our landing upon, or departing from, the cay.

Miles away and long before the small boat was launched and loaded we had been anxiously eyeing the reef for signs of bird life. Our information was not at all encouraging, since such as we had only established the existence of bird colonies there in 1857 and 1896. Whether the birds were there this season or, if so, had their nesting been broken up by an unusual visit from some becalmed ship, we did not know.

Schooners carrying 15 or 20 dories and a crew of 20 or more negroes are continuously searching the shallow waters of the Bahamas for sponges, and, as might be expected, have made a practice of landing upon islands for birds' eggs and their young and, when possible, taking the breeding

birds themselves. The result has been in recent years bird life in the Bahamas has been threatened with extinction.

Some of the readers may recall Doctor Chapman's efforts, covering three seasons, to locate on these islands a breeding colony of the pink flamingo, and how at last he succeeded, discovering a breeding place many miles in the interior of a large marshy island, so remote as to have escaped the vigilant eyes of the natives.

The extreme isolation of Cay Verde and the absence of protecting land in the neighborhood make the landing too uncertain to warrant a trip by the natives in search of eggs or young birds. As the yacht approached a little nearer we saw high over the island the graceful, soaring flight of several man-o'-war birds, and later could see, coming from all directions, wisps of boobies, bringing in their pouches the evening meal for their hungry offspring.

At times they were intercepted in mid-air and compelled to disgorge for the benefit of the man-o'-war bird. The diet of that hawk of the sea consists wholly of flying fish or the toll collected from the good-natured boobies, the presence of which makes certain a supply of fish for the young of its piratical neighbor.

Just as the tropical sun was sinking the *Physalia*, sailing through a crimson sheen, dropped anchor off a pretty little sand beach mortised in between black and jagged battlements of æolian rock, which in broken masses circled the rest of the island. We had a large cask of water and a box of provisions sent ashore for use in case we should be marooned by the forced withdrawal of the yacht under stress of weather.

AT CAY VERDE—AMONG BOOBIES AND MAN-O'-WAR BIRDS

Disembarking with our cameras, we landed for a three days' stay. A shelter for the night was made from an old sail supported by an oar and our tripods; and then Doctor Mayer returned to the rolling vessel with a calm and satisfied demeanor. We secretly rejoiced at having beneath our blankets solid ground, hard as it was.

In the fading light Doctor Chapman and I stood by the little tent, gazing with curiosity and pleasure upon thousands of dark-colored boobies, which stood in solid silence upright on either side of their single white-plumaged young. Some of them were not 10 feet away from the tent. Far-



MAN-O'-WAR BIRDS SOAR OVER THEIR NESTS ON CAY VERDE

The long narrow wings, having a spread of between six and eight feet, and the long forked tails, sometimes open and sometimes closed in flight, gave these birds a strikingly characteristic appearance as they fly high. Although very large, man-o'-war birds are extraordinarily agile on the wing and gain much of their food by pursuing flying boobies or other sea birds and making them disgorge fish. They then swoop down, and on a graceful upturn seize the food in their beaks as it falls. Flying fish, too, are taken.

ther away we could see the circling man-o'-war birds descending for the night to their nests, scattered throughout a low thicket composed of sea-grape bushes and spiny cactus. Later the lantern showed the boobies near us sleeping with their heads tucked under the feathers on their backs. They had the appearance of headless parents beside headless chicks.

At sunrise we were up, and before attempting breakfast made a hasty trip to the higher part of the island. There with field glasses we carefully studied the birds, mapping out our plan of action.

Our investigation then and later showed the island to be about 30 acres in extent and to contain more than 3,000 ground-nesting boobies and 500 to 600 man-o'-war birds. Each colony was at the time in the midst of its nesting season.

Some of Doctor Chapman's comments on the birds of these colonies are quoted:

"As the most abundant and easily observed of the two birds nesting on the cay, the booby first commanded our attention.

"A partial census of eggs and young led to the conclusion that about 1,500 pairs of boobies were nesting on Cay Verde. They were distributed in several groups, where the comparatively level surface and sandy soil furnished favorable nesting conditions. In most instances the young were covered with down, with the brown second plumage more or less evident in wings and tail. For the greater number of birds, the nesting season, as Bryant has stated, evidently begins in February. One or both of the adults remain, as a rule, with the young.

"The young booby is born naked, and since exposure to the sun before the downy



A BREEDING COLONY OF MAN-O'-WAR BIRDS

An old black parent is on the nest and young white birds are scattered through the thicket. The nests are built on sea-grape bushes surrounded by impenetrable cactus.



FIVE NESTS OF MAN-O'-WAR BIRDS WERE IN A RADIUS OF SIX FEET

They build their homes close together, their colonies reminding one of the hangouts of the human pirates who once made headquarters in these islands. In habits, too, they resemble the old-time marauders of the sea.



THE YOUNG MAN-O'-WAR BIRD ALWAYS STANDS ERECT IN THE NEST

When it grows up it will have a greater expansion of wing in proportion to the weight of its body than any other bird, and in power of flight will be unsurpassed. It will soar for hours at a great height, often far out at sea. The long, narrow, powerful bill has at the end a horny hook, in appearance and substance like a talon, while the feet, from lack of use, are small and atrophied.

plumage is developed would result fatally, it is constantly brooded, the parents taking turns at the brooding. Brooding continues even when the white down is well developed; the young bird is then too large to be wholly covered by the parent, and lies flat on the ground, the head exposed, the eyes closed, apparently dead. The young feed on squids and fishes, which in a more

or less digested condition they obtain by thrusting their heads and necks down their parents' throats.

"The luxuriant growth of cactus among the sea grapes, in which the man-o'-war birds nested, increased the difficulty of penetrating the thickly branched, shrubby trees, and we did not attempt to make a census of the number of birds of this spe-

cies breeding on Cay Verde. We estimated, however, that there were between 200 and 300 pairs.

"Occasionally they chased the adult boobies and made them disgorge in the air, but evidently, in the main, they did their own purveying, flying fish being taken from one bird that was shot."

The adults were not heard to utter a sound. The nests were frail, slightly hollowed platforms of open-work, composed of small sticks and twigs, placed in the tops of the sea grapes, at a height of six or seven feet, or among the cactuses within two feet of the ground. Several nests are often placed in one bush within reaching distance of one another.

BOOBIES AND MAN-O'-WAR BIRDS ARE POWERFUL FLYERS

Both the boobies and the man-o'-war birds interested me by their powers of flight. The boobies are rather heavy-bodied birds, but go far to sea in search of fish and have the power to soar or glide long distances on set wings. Boobies usually fish against the wind, flying low over the water and entering it in full flight at an acute angle and coming out at a similar angle still in full flight against the wind, some 30 or 40 yards beyond. While submerged, they appear to fly as they do in the air.

The man-o'-war birds have an extraordinary mastery of the air. They are lighter bodied than the boobies, with a much greater supporting expanse of outspread wing and tail. Although their wing strokes appear deliberate, they can easily overtake boobies or sea gulls in full chase and force them to disgorge their newly-captured prey. As the food falls, these great birds swoop down and catch it dextrously in midair. They sometimes soar for hours far up in



WRECKERS EYED THE "PHYSALIA" WITH INTEREST

After the craft had survived the hurricane which drove it all over the seascape, it went aground on a reef in calm weather (see text, page 226).

the blue, like buzzards, and descend in splendid diving flight on set wings.

After Chapman and Mayer had made a careful count of the booby colony, they came to me, as their only auditor, to tell of the remarkable discovery that, while every booby's nest contained two eggs, no nest contained more than one young. Thereupon I went forth to make some discoveries on my own behalf, and soon returned with the news that while the man-o'-war bird laid only one egg, it hatched out two young, and that, therefore, my discovery, from an economic standpoint, was more important than theirs about the boobies.

This frivolity was received in silence by my two scientific friends, for joking on such a serious matter could not be approved. The mystery of the missing young of the boobies was solved when we discovered the peculiar fact that there appeared to be a difference of 10 days between the eggs, so that the first hatched became the sole survivor.

A DIFFICULT RETURN

Several times in the course of our stay on the Cay the *Physalia* changed its anchorage as heavy winds came on, and on one night in particular we were much alarmed when in the midst of a violent thunderstorm the lights upon the boat disappeared. The trouble was occasioned,



THIS FEMALE MAN-O'-WAR BIRD MEASURED EIGHT FEET FROM TIP TO TIP OF HER WING

In the background may be seen the expectantly raised heads of the down-white young on the platformlike nests. The mother has doubtless preyed on boobies, forcing them to disgorge the fish they have caught, and she is now returning to her offspring, which will thrust their beaks down her throat and obtain a part of the stolen meal.

we discovered the next day, by the violent rocking of the vessel. At the end of the third day our work was done, and then began the journey back to Nassau.

Delays were numerous, but none was serious until April 16, when, for the only time, aside from the night of the hurricane, we attempted a several-hours' night run with the advantage this time of a fair wind and full moon. We wished to reach Nassau next day if possible, when the last steamer of the season left for Miami. At 11 p. m. the yacht suddenly stopped, the masts shook violently, the sails flapped, and behold—we were upon a reef, at high tide, a

mile out of our course through the treacherous currents of these broken waters.

At daybreak, when the tide was low, we found ourselves perched on a sand bar in six inches of water, with a deep channel on either side. The wind remained light and with a large island a mile to the east the boat alone was in danger should the wind increase.

LABOR TO GET OFF THE REEF

Here we remained for three days, working like beavers at the windlass in an effort to drag the yacht into deep water, but not until it was stripped of all its ballast, pro-



A MAN-O'-WAR BIRD DESCENDS ON THE NEST

Note the remarkable forward wing movement. Perhaps this is a sort of brake to check speed. Certain it is that these birds are capable of amazing feats in the air. They can swoop down on a flying booby, force it to drop the fish it is carrying, and catch the food before it reaches the water.

visions, anchors, and other weights did we succeed in getting it off. Success came to us with high tide at midnight of the third day.

While we were stranded on the reef, we were the object of more than casually interested attention from native wreckers in a small boat. They evidently expected that we should be obliged to abandon our craft to their tender mercies (see illustration, page 225).

The bar we had struck lay just 10 miles south of where we had begun the all-night run of April 1. The next day we reached Nassau, too late, of course, for the Miami boat. Chapman returned to Miami on the

yacht and I to New York on a Ward Line steamer. Neither of us was any the worse for our exciting experiences; and though we naturally felt thankful to be safe home again, we should not have hesitated at taking the same risks a second time.

CHAPMAN OBTAINED MATERIAL FOR A
FINE HABITAT GROUP

The tangible results of this unexpectedly adventurous voyage were the material from which, under Doctor Chapman's direction, were built two of those wonderful habitat groups of American birds for which the American Museum of Natural History has become famous; and a series of photo-



THE "PHYSALIA" WENT ON A REEF (SEE TEXT, PAGE 226)

In navigating the treacherous channels among the Bahamas, one must be constantly vigilant. The masts of this yacht were over tall for the hull and trouble resulted.

graphs by Doctor Chapman and me of two interesting sea birds at home.

The journey was one that I look back upon with genuine satisfaction; for in its course I experienced the thrill of shipwreck and a sort of Robinson Crusoe life on a lonely island, at the same time finding unusual opportunities for camera hunting. Both my pictures and Doctor Chapman's

specimens form a lasting record of the lives of the booby and the man-o'-war bird in a remote breeding place where they are virtually undisturbed. There is a supreme thrill of discovery in coming upon such creatures of the wild in their natural state and in knowing how they live when they have not the softening, often demoralizing bounty of "crumbs from the rich man's table."



CHAPTER IX — PART I

Wild Fowl and Animal Life of the Louisiana Marshes

THE winter home of millions of the wild fowl that go down the Mississippi Valley flyway when the coming of winter in the North drives them southward, is in the vast marshes bordering the Gulf in Louisiana.

In February, 1920, with such congenial companions as Frederic C. Walcott, conservationist and later United States Senator, Lord William Percy, and Charles Sheldon, sportsman-naturalist, I realized a long-cherished ambition to visit the McIlhenny property and other parts of the Gulf coast marshes.

A MECCA FOR NATURALISTS

To have Edward A. McIlhenny as our host, both on shore and on his house boat, meant the height of hospitality and a pleasant and a profitable outing. Close by his residence were ponds that harbored several species of ducks; and when these migrated north, the snowy egret, the Louisiana heron, the purple gallinule, and other water birds took their places. We passed most of the time on the house boat, well out on the marshes, where the canvasbacks and ring-necked ducks were numerous. Specimens of the latter were especially desired by Lord Percy.

At our first breakfast on board, John Hammer, who usually accompanied me on such trips, came in with a heaping platter of corn dodgers. Lord Percy eyed them suspiciously and said he would not touch such "blasted things." We induced him to try one, however; and after a dozen had followed, whatever umbrage John had taken at the insult to his cooking vanished.

A discussion arose one evening between McIlhenny and Percy as to whether ducks can smell a hunter in the blind when the wind is offshore. Our host took the affirmative and the rest of us silently backed Percy in the negative.

In the following two days I had experiences that weakened my belief. When I entered the blind the first day, a heavy wind was blowing from the water side and the ringnecks were being buffeted about and were almost thrown into the blind in searching for corn. It was almost possible to reach out and touch them; and photo-

graphing them was therefore difficult, since it was often impossible to get a proper focus at such close range.

On the next day conditions were reversed, and the wind blew from the blind across the water. After I had secreted myself, the birds began approaching, swimming in a solid mass from one side of the blind toward the other. But no sooner did the leading ducks cross the line of my scent than they turned back. This continued for two hours, and not one of the ducks went to its customary feeding place. I gave up the attempt to photograph them, for neither day had been successful from a photographer's point of view. What was the explanation?

In the course of our stay on the Gulf coast I made an effort to photograph the famous blue geese, and went to a sand beach where these birds came daily to pick up small gravel as an aid to digestion. The newly constructed and conspicuous blind kept them at a distance, and I finally left, somewhat disappointed at my failure to get pictures, although pleased at the opportunity of seeing these handsome birds. Several years later, and in the same neighborhood, I was more successful.

WHITE PELICANS

While on the Gulf coast, I saw large flocks of white pelicans resting on sand bars. The last time I had seen these birds, they had been nesting in large numbers on a Rocky Mountain lake. For a long time it was rumored that white pelicans breed on the coast of Texas, and in recent years it has been learned definitely that they nest in considerable numbers, with many other water birds, on Bird Island, in Maria Madre Lagoon, south of Corpus Christi.

Later in our visit, Colonel Alexander, head of the Louisiana State Game Commission, arrived in his comfortable yacht and showed us the Sage and Rockefeller wild-fowl refuges. After going as far as the Texas coast, where we saw many water birds, we returned on the commissioner's boat to New Orleans by canal. Here we had a good view of the French fishing



THEY ARE SAFE AT AVERY ISLAND, LOUISIANA

These blue-winged teal, lesser scaup, and coots are feeding in shallow water. At dusk the teal leave for the rice fields, where the planters cannot shoot them legally after sunset.

villages and admired the gracefully constructed dugouts, known as pirogues, which far surpassed in beauty those of the Ojibway Indians of the Lake Superior region.

Considering its brevity, one of my most informative and interesting camera trips was a visit to a 26,000-acre tract of marshland on the western side of Vermilion Bay, near the southern coast of Louisiana. This property was the former hunting grounds of Paul J. Rainey, whose sister, Mrs. Rogers, generously presented it to the National Association of Audubon Societies as a perpetual memorial bird refuge in his honor. Situated in the center of the winter home of many kinds of ducks, it is winter quarters of the blue goose, whose distant summer home is on Baffin Island, within the Arctic Circle.

In the first week in February, 1927, I left Florida with Mr. J. P. Holman, an official of the Association. We passed through New Orleans, and then crossed the Mississippi and beyond to Abbeville, where we found awaiting us a large cabin launch in charge of the Association's efficient and agreeable superintendent, Richard Gordon.

The trip down the Vermilion River and lagoon was interesting, for buzzards occu-

pied every dead treetop and hundreds of turtles of several kinds were disturbed from their sunning places by the surge caused by the passing launch. In Vermilion Bay, however, only the winds and the waves showed activity, for the salt waters permitted the growth on the submerged marshes of rank grasses only. In the absence of duck foods few birds were about.

THE RAINEY WILD-LIFE SANCTUARY

Near the reservation headquarters the launch entered a small canal, and soon we were quartered in a most comfortable habitation. A stone's throw away was a circular body of fresh water a mile in diameter, known as Belle Isle Lake. Here the marshes, which were above most of the higher tides, permitted the growth of aquatic plants absent in saline waters.

Only a week before our visit it had been estimated that more than 50,000 canvas-back and broadbilled ducks frequented this lake daily. During the previous fall the surface had been entirely covered with thick green leaves of the banana water lily; but now, aside from a few uprooted plants, all had been eaten, and naturally most of

the open-water ducks had departed. Only one flock of canvasbacks swam by my blind.

The quantity of food required by great gatherings of wild fowl is amazing. When the supply gives out on protected waters the birds must necessarily go to other marshes, which may be unprotected. Before the coming of the white man an excessive increase in bird and animal life must have been checked by the exhaustion of the food supply or by disease.

In the present day the problem of the conservationist is how to prevent starvation of the birds as well as the excessive shooting of them. To this end refuges are necessary, and few are proving more successful than the one we visited. We found marsh ducks, such as the mallard, black duck, pintail, widgeon, and teal, abundant on the smaller ponds, but wing pictures were hard to get because of several days of dark, cloudy weather.

THE BLUE GOOSE

The Rainey refuge is one of the principal winter homes of the blue goose, although this bird is found in many of the neighboring marshes. Local observers have recently estimated its total numbers at more than 400,000.

Mr. Holman recorded the incidents of the first afternoon as follows:

"Before supper we sped down the main canal, in the speedboat *Whistler*, to Belle Isle Ridge. As we shut off the engine and neared the bank, a loud cackling greeted our ears, and in a moment we were surrounded by thousands of blue and lesser snow geese, rising like a pillar of light against a blue-gray sky."

"It was truly a wonderful sight. As we gazed, new groups of birds rose and added to the sweeping tide of life and din of voice, until the whole heavens seemed to be filled with beating wings and soaring bodies, weaving in and out, etching a pattern of silver on a background of blue canvas."

The blue goose seems to spend most of each day on parts of marshes covered with only a few inches of water, and at night it sleeps on the open water of ponds and small lakes. It feeds largely on the roots of *Scirpus* and other marsh plants, which grow luxuriantly in water supplied by frequent rains. A flock of sometimes 5,000 or more blue geese, feeding on the marsh, is

a stirring sight. In a solid phalanx they uproot all in front of them and trample down the rejected portions, so that the areas cleared each day become shallow, open water.

In the middle of the last century flocks of wild pigeons would work through a field of buckwheat and cause great havoc. Since they were more active than the geese, the ones in the rear would rise and alight ahead, so that they appeared like a wave rolling over the field. The general turmoil at the feeding places of both species are sights long to be remembered.

I passed several days in a blind baited with corn, trying to get photographs of blue geese; but they evidently knew nothing about grain, and numerous grackles were the main beneficiaries. One lone goose, however, was encouraged by the eagerness of the small birds to try the corn (see page 239).

After using my last plate on it, for I had taken many wing pictures of passing flocks, I noticed marching toward the blind a regiment of blue geese containing a few white ones, which looked like officers in their light uniforms. Rather than have the exasperation of this parade taking place in front of me when I was out of ammunition, I arose and frightened them away.

These geese come south in November from their island home within the Arctic Circle, and most of them depart between the last of March and the first of May. Considering the great size of the present flocks and the distance they travel, one wonders at the small proportion killed on the way. They must have little interest in the rest of the country when traveling between their two homes, although since spring shooting has been prohibited, they have been seen on some northerly waters, both in the East and in the West, awaiting the opening of the Arctic.

BREEDING PLACE OF THE GEESE

Within the last few seasons the mystery of the breeding place of these geese has been solved. Their nests have been discovered on Baffin and Southampton islands north of Hudson Bay.

On the canal we went several mornings after the sun was well up to a large circular pond, where we got into a flat-bottomed skiff for the other end of the pond. There a blind had been built and some grain scattered about. On our arrival all the



RING-NECKED DUCKS TAKE TO THE AIR IN FRIGHT



CAN DUCKS SMELL THE HUNTER?

The flock in the upper picture was photographed at Avery Island as it turned and flew away in alarm, just at the point where the slight offshore breeze carried the human scent to it. The phenomenon occurred repeatedly, and no other cause for the alarm could be noted. When the wind blew inshore, the birds shown below came within a few feet of the blind. Were they alarmed by the scent? (See text, page 229.)



Photograph by Shiras and McClintock

A PURPLE GALLINULE COMES TO HER NEST

Many of these birds breed in the Louisiana marshes, where this picture was taken. They are semitropical birds found in summer on our Gulf Coast.



Photograph by Shiras and McClintock

A LITTLE GREEN HERON STANDS BY ITS EGGS

Perched on its nest near Vermilion Bay, Louisiana, it keeps its eyes open for chance disturbers.



CANALS OPEN THE LOUISIANA MARSHES

Thousands of miles of these waterways and smaller tributaries for trappers' pirogues now render all parts of the area accessible. Such places once were natural wild-fowl sanctuaries.



A SNOWY EGRET STANDS WATCH OVER ITS YOUNG, NEAR VERMILION BAY

Like its larger relative, this bird was much reduced by plume hunters, but is now less persecuted and is again becoming common in some places.



THEY ARE AMONG THE BEST TALKERS

This pair of double yellow-headed parrots perch near their nesting hole in a tree trunk at the headwaters of the Tamesi River, Mexico.



PARROTS ABOUND ON THE TAMESI

This red-capped fellow, perched on a treetop, eyes the photographer with distrust, but remains quiet long enough for the picture.

larger ducks took wing, but no sooner were we in the blind than small flocks of coots came out of concealment in the reeds, determined to be the first at the banquet. They were followed by several dozen blue-wing teal.

In a few minutes the mallards, black ducks, and pintails would return, driving away the smaller waterfowl. It was an entrancing sight to see the mixed patterns and different colors of the marsh ducks at such close range; and then, after they had finished their repast, to see them climb up on little tussocks to sun and preen themselves.

In the afternoon, when the sun was in a favorable direction, I would sometimes go to a blind on Belle Isle Lake in hopes of getting a few pictures of canvasbacks and scaups that still lingered there after the lake had been depleted of the banana water lilies. In these efforts I was fairly successful. On our few days' visit there was plenty to do, and if I had an odd hour or so I would take flight pictures of the blue geese, high overhead, as in long files or platoons they circled over the vast marshes in the neighborhood.

The blue geese have a competitor for the *Scirpus* roots in the Louisiana marshes—the muskrat. Because of the scarcity of surface water in this section, muskrats build their dome-shaped houses, which resemble small haystacks, of coarse grass on top of the muddy soil. From the houses little canals filled with water, extend through the marshes in many directions.

THE LOUISIANA MUSKRAT PROLIFIC

Breeding throughout the year and having neither ice nor severe weather to contend with, the Louisiana muskrats are very prolific. This makes possible the harvesting of an annual catch that in some seasons runs into the millions, exceeding that of all the rest of the country combined. The total annual return to the trappers during several years of good prices is estimated to have exceeded \$5,000,000.

I was surprised at the high grade of the pelts, for in such a southern range heavy fur would not be expected. The Rainey sanctuary income from the muskrat pelts is useful in the purchase of grain and other food for the feathered tenants. The food put out induces the birds to stay in the safety zone



BLUE GEESE THROG THE RAINEY WILD-LIFE REFUGE NEAR VERMILION BAY

Most North American waterfowl are widely distributed, but practically all the blue geese in existence winter in the Louisiana marshes and breed on Baffin Island. The 26,000 acres of the Rainey Wild Life Refuge constitute one of their favorite haunts. There they find marsh grass roots in abundance.



A FLOCK OF BLUE GEES LEAVE THEIR FEEDING GROUND ON THE RAINEY REFUGE, LOUISIANA

Usually about one in eight or ten birds in these groups is a lesser snow goose, some of which appear in this picture. In the summer of 1929 the nesting place of the blue geese was definitely located in southern Baffin Island.



SUCH AN ANIMATED SIGHT IS COMMON ON THE LOUISIANA DUCK MARSHES

Unlike the deep-water ducks, those of the sloughs, such as the mallard, black duck, and pintail, rise perpendicularly from the surface when alarmed, whereas the diving ducks ascend gradually. In the Gulf region the wild fowl escape the rigors of the northern winter, and many find a safe retreat on the Rockefeller, Sage, and Rainey refuges.



A BLUE GOOSE IS ATTRACTED BY CORN BAIT IN THE LOUISIANA MARSHLAND

The author passed long hours in a blind waiting for blue geese to come to scattered corn bait. Boat-tailed grackles promptly came to the feast, and their presence may have attracted the solitary blue goose that came in to investigate this strange food (see text, page 231).



CANVASBACK DUCKS LIKE RAINEY REFUGE

Before the author visited this sanctuary, in February, 1927, a fresh-water lake adjoining the clubhouse was entirely covered with the banana water lily, which attracted more than 50,000 canvasbacks and scaups. But when he arrived, these plants had all been eaten, and only a single flock of canvasbacks remained to be pictured.



BOATING HAS ITS DEVOTEES ON THE TAMESI RIVER, MEXICO

Large cayucos, or dugout canoes, manned by natives in broad-brimmed straw hats, were often seen on the river before the camp.



HE WAS THE FAMILY PET ON THE PLANTATION ON TAMESI RIVER

This small form of the white-tailed deer is common in eastern Mexico, where the author passed some time photographing wild life.



THE END OF A SUCCESSFUL DAY BRINGS A SMILE

Toward sunset Superintendent Gordon in his ducking boat crossed over this pretty little fresh-water pond to the blind to get the author, who had bagged several hundred ducks with his long-focus camera.

instead of visiting nearby marshes where gunning is permitted.

The marshland of Louisiana is the main southern home of the muskrat, though a few of the species are found in Texas. Shortly after we left occurred the great Mississippi flood of 1927, which drowned or dispersed millions of muskrats on the lowlands nearer the delta. The flood waters, however, spread out rapidly on reaching the Gulf, and caused no damage in the vicinity of the Rainey sanctuary.

FUR PRODUCTION IN LOUISIANA

The Louisiana muskrat is a separate subspecies (*Ondatra zibethica rivalicia*) and, like the other forms, is found naturally only in North America.

Even the beaver, generally regarded as a northern species, has several colonies in northern Louisiana, where they are protected throughout the year.

A recent tabulation for one year shows the variety and value of Louisiana furbearers, and clearly indicates the importance of fostering an industry on lands otherwise nearly worthless and exceeding 2,000,000 acres in extent:

Species	Pelts taken	Value to trapper
Muskrat	6,196,165	\$5,142,896
Opossum	287,180	258,462
Raccoon	145,810	583,240
Mink	84,301	421,505
Skunk	14,752	18,440
Otter	2,110	31,650
Miscellaneous	947	947
	6,731,263	\$6,457,140

In addition to its wealth of fur bearers, Louisiana is a wonderful State for game birds and animals with its deer, bear, wild turkey and quail, and its multitude of geese, ducks, snipe, and shore birds, which make it a paradise for the man with the gun or for him who prefers the camera.

Additional laws and better enforcement are needed, however, if the game animals and birds are to continue abundant. This criticism applies to many parts of the South, which, in general, underestimates the value of its wild life, not only to its inhabitants, but to visitors.

Florida, Georgia, Alabama, Louisiana, and Mississippi have immense areas that



MAIN CAMP WAS ON AN ISLAND IN THE TAMIAHUA LAGOON

There the author and his friends were in the midst of swarming breeding colonies of birds. The roseate spoonbill was the nearest, not more than 75 yards away.



COOTS SWARM ON THE TAMESI RIVER

Great numbers of these waterfowl frequented the lower river at the time of the author's visit. This group was photographed at a gathering place near shore.



THE BLACK ANI LOOKS LIKE A MOURNER

This southern and somber-garbed member of the cuckoo family is called a "tick hunter" by the natives living near the Tamesi River, Mexico.

furnish a congenial habitat to the white-tailed deer, and yet these States combined contain fewer of these animals than a single one of them should.

The South's long freedom from the necessary restrictions of game conservation has blinded it to the urgent demand of the present and future.

A notable feature in the recent development of the Louisiana marshes is the many canals, costing millions of dollars and extending hundreds of miles, many of them through sections heretofore inaccessible to

the hunter or trapper (see page 234). This construction has been largely brought about by the muskrat industry and to a lesser extent by ducking clubs. Naturally, such development endangers the wild fowl in marshes where they have never before been disturbed.

I noticed that, unlike the northern muskrats, those of Louisiana do not build any of their homes in the many miles of banks formed by dredging canals, except in the large canal banks in some rice fields where their nests and young have been found.



CHAPTER IX — PART II

Bird Hunting With a Camera in Eastern Mexico

IN 1908 I found Doctor Chapman anxious to visit the great Tamiahua Lagoon, near Tampico, Mexico. One of the reasons for his desire was the declaration by our friend, Charles Sheldon, that a large colony of roseate spoonbills was breeding on an island in the vicinity. At that time this interesting bird had become nearly extinct in Florida. It has since increased, I am happy to learn, in a few localities there.

We planned to make the trip the following year, but became discouraged by a report that one of the largest oil wells on the shore of the lagoon had taken fire, got beyond control, and covered the surface of the lagoon with oil, besides forming a mass of sticky tar around its shores. All waterfowl had thus been destroyed or driven away.

A year later the floating oil had disappeared, and the tar on the shores had hardened. With this improvement of conditions many of the birds had returned and we undertook the trip. A third member of our

party was Louis A. Fuertes, the famous artist-naturalist, whose congenial companionship contributed much toward our pleasure. His death a few years ago in an automobile accident caused great sorrow not only among nature lovers and scientists, but especially among the students and faculty of Cornell University, where, as an alumnus and preceptor, he was much beloved and honored.

At Tampico, before visiting the lagoon, we gladly accepted the invitation of a fellow American to visit his sugar plantation, 75 miles up the Tamesi River, where he assured us we should see many birds and animals not found along the coast.

Instead of taking a slowly moving dug-out, such as is used by the natives, we were transported in a comfortable launch and reached our destination the first day. After passing through some duck marshes, we entered the river, which here flows between high banks, and resembles a canal. It was bordered on either side by tall banana



THEY ARE ROBBERS WHEREVER THEY GO

A mischievous small species of crow living in flocks occupies parts of both coasts of middle Mexico.



ROSEATE SPOONBILLS IN FLIGHT MAY EASILY BE RECOGNIZED

The peculiar silhouette of these birds distinguishes them sharply from the white ibises and herons which frequent the same locality.



GRACKLES AND RED-EYED COWBIRDS APPEAR TOGETHER

Mexican great-tailed grackles are numerous about towns and plantations of middle Mexico. Their courting and other antics are most amusing. With them commonly occur the red-eyed cowbirds which have a curious ruff of long feathers about their necks.



WHITE IBISES ARE APARTMENT DWELLERS

Among the mangroves bordering Tamiahua Lagoon the author found great breeding colonies of these birds. Many nests were built in the tops of single trees, where usually they were hidden by the outer foliage. Several of the slate-gray young in the nests are visible in the photograph.

plants that waved a friendly greeting in the breeze.

In the country back from the river aridity limits agriculture and tree growth. It was not until we had nearly reached the plantation that we came in sight of a dense, primeval forest above which muscovy ducks were flying back and forth.

These large, handsome birds, like the brilliantly colored wood ducks of the north, nest in hollow trees. Thus they escape the hordes of small prowlers that, in this region, jeopardize ground-breeding birds when they are rearing their young.

From Doctor Chapman's notebook I quote the account of our arrival and the first impressions we received:

"Soon the Tamesi narrowed to a width between 100 and 200 feet, which it kept with little variation throughout the day.

"When we arrived at 5:30 there was just enough light left to enable us to pitch our tents in the ranch-house clearing on the bank of the river. The brown stream flowed silently by some 20 feet below us, with no hint of the loss of life and property it had caused only the preceding season, when it had flooded the country for miles.

"It is commonly believed that to see tropical birds in abundance one must go at least to South America; but I have yet to find, in a somewhat extended experience, any place where certain eminently characteristic tropical species are more abundant



A ROSEATE SPOONBILL TAKES FLIGHT FROM A TREETOP

Because the bird turned its head to one side to watch the photographer, its bill appears narrow.



A ROSEATE SPOONBILL GUARDS ITS NEST

The dark band extending back from the bend of the wing is rich deep scarlet. The rest of the bird's plumage is a bright pink.



Photograph by Frank M. Chapman

FEEDING WENT ON UNDER DIFFICULTIES

Doctor Chapman wrote, "We could see dozens of delicately colored pink forms, while in nearly every tree one or more nests held young nearly as large and as pink as the parents which had just left them. We had at last reached the home of the spoonbill."

than we found them at this camp on the Tamesi River, distant less than four days from Chicago!

A BIRDLAND BABEL

"We were awakened by the loud calls of flying parrots, not passing over at a great height, en route to some distant feeding ground, as one usually sees them, but stopping, with much conversational chatter, to join scores which were breakfasting in the trees overhanging our tents.

"At once we recognized the 'double yellow-head' (*Amazona oratrix*) of the bird stores, rated by dealers as second only to the gray, red-tailed African parrot in its

power of speech, and second to none as a whistler. With it was a slightly smaller, red-capped parrot (*Amazona viridigalis*), which, whatever it may be in a cage, is vocal enough in nature.

"Parakeets of two species, with darting, dovelike flight, shot through the clearing, uttering their sharp, rolling cries, or, entering a treetop, disappeared with incomprehensible completeness until, assured of the safety of their surroundings, they began slowly to move about in search of food.

"Red-billed pigeons (*Colomba flavirostris*) nearly as large as our domestic bird shouted their emphatic hurrah, and the dainty little scaled doves filled in the gaps



A FLIGHT OF WHITE IBISES WHEEL AND TURN IN SPECTACULAR MANEUVERS

When the author approached the closely occupied nesting place of these birds at Tamiahua Lagoon, south of Tampico, Mexico, they would rise in a cloud of white flecked with their jet-black wing tips. They soared about in a maze, almost dazzling the eyes in the brilliant sunlight.

with their quaint *put-a-coo, put-a-coo*; ground doves mourned gently, if inconsolably, and the pygmy owl (*Glaucidium*) whistled with clocklike regularity from the top of a leafless tree—a perch which this diurnal, light-loving midget prefers.

"Great-tailed grackles creaked, sniffled, whistled, choked, and rattled; queer little Mexican crows, looking not much larger than blackbirds, perched in flocks in the leafless trees, snoring and grunting; flycatchers (*Myiozetetes texensis* and *Tyrannus melancholicus*) twitted excitedly; Derby flycatchers (*Pitangus*) cried *hip, hip, hurray*; gold and black orioles whistled like schoolboys homeward bound; anis whined; golden-fronted woodpeckers coughed; and ever and again the big Mexican pileated woodpecker sprang his trumpeting, reverberating rattle with astonishing effect.

WALKING WAS NOT A PLEASURE

"Three factors accounted for the abundance and familiarity of the birds about our camp in the ranch-house clearing: First, the larger forest trees had been left standing and only the undergrowth cut out; second, many of these trees, locally known at 'otatheite,' were bearing fruit of which parrots and some other birds were particularly fond; third, the birds were not molested.

"To see the species which required either undergrowth or wholly primeval conditions, one needed only to climb the corral fence 200 yards away and enter the forest on its farther side. The trees were not high, but the growth was dense, and in places the ground was covered with wild pines having leaves bordered by a series of strong hooks, which, set in both directions, were more productive of pain than pleasure to the unwary walker.

"No one lacked for occupation at Paso del Haba. Shiras hunted with camera by sunlight and flashlight, obtaining photographs of birds by day and of beasts by night, and left, no doubt, a more vivid and lasting impression on the minds of two natives who unwittingly sprang one of his flashlight camera traps than even his dry plates recorded."

Of the 88 species of birds we saw in the week of our stay, no less than 36 are tropical forms that in this latitude are at or near the northern limit of their ranges.

In addition to the many birds mentioned



ROSEATE SPOONBILLS STAND ALOFT

by Doctor Chapman, there was one that forced its attention on me by its rattling, raucous calls, that sounded like "chach-alacca." This rendering of the call has been adopted as the name of the bird. It is a member of the pheasant family, and of course is classed as a game bird.

I had never before heard a bird of an edible character announce its presence in such loud tones. In the North a game bird that so noisily and carelessly proclaimed its whereabouts all day would not last long.

After taking pictures of several kinds of parrots and small birds, I tried to get flashlight pictures of the several members of the cat family; but, as so often has been the case when I have been photographing in tropical America, the opossums and other small animals usually fired the flashlight soon after dusk.

Alas, the only large creatures taking their own pictures were roving cattle and, in one instance, two native girls, who, on the explosion, fled to their thatched hut in terror, believing they were the intended victims of the visiting Americanos. I got several pictures, however, of a white-tailed doe, which, being accustomed to our host and his family, permitted me to approach it closely as it was quietly feeding at the edge of the forest.

After our return to Tampico we made preparations for our long-deferred visit to Tamiahua Lagoon, and learned that the journey was to be much easier than we had anticipated because of the recent



MEXICAN CORMORANTS HAVE HEADQUARTERS ON THE TAMIHUA LAGOON

These powerful swimming and diving birds live upon fish they pursue and capture under water, but they habitually perch on the tops of trees, where they also make their nests.



A FEMALE MAN-O'-WAR BIRD SITS ON ITS NEST

Note the white breast which distinguishes this sex from the uniformly black male. The picture was taken near Tamiahua Lagoon.



HIS THROAT SWELLS WITH AFFECTION

The male man-o'-war bird in the mating season inflates a large bright red sack on its neck, like a toy balloon. This amazing nuptial adornment may be seen at a long distance, as indicated here.

construction of a canal from the Panuco River to the north end of the lagoon.

With two local guides, we departed in a launch, on the afternoon of April 11, and at the coming of sunset were still in the canal. While we were preparing the evening meal on shore, we saw two teal ducks flying swiftly down the canal in our direction. Fuertes, always alert to whatever was happening, deftly brought down one of them almost into the frying pan. The following day we reached the southern end of the lagoon. We passed great numbers of coots, besides some canvasbacks, gadwalls, and shovelers, but most of the ducks had gone North.

On reaching the island supposed to harbor the colony of spoonbills, we were all expectant. Disappointment seemed in store, however, for none of the birds were to be seen. We ran the launch into a narrow cove well shaded overhead by dense trees, and while the rest of us busied ourselves in getting out the camp equipment, Chapman made a reconnaissance to canvass the situation. He soon returned with the good news that hundreds of spoonbills were nesting within a hundred yards, and

that a little farther away were flocks of white ibises also in attendance on their nests, which were built on the low bushes (see page 247).

For the next few days we were busily employed among these colonies. Taking an afternoon off, we visited a colony of man-o'-war birds that were breeding on a small island a mile away (see page 252). In addition to taking motion pictures of spoonbills, Doctor Chapman obtained a number of specimens of the birds for his habitat group, which may now be seen in the American Museum of Natural History.

SAFETY FIRST

It should be noted that on this trip I was accompanied by my old Norwegian camp companion, John Hammer, whose announcement that a meal was ready always found us nearby.

One morning I noticed that John, famous for his corn dodgers, was not eating them. "Are you sick?" I asked. "No," he replied, "but I don't want to be." Then he spoke about Doctor Chapman's taking a lot of our corn meal and mixing it with arsenic to preserve the skins of his



PORTRAITS OF TWO MEXICAN CORMORANTS

These birds were abundant in the country around Tamiahua Lagoon, where this photograph was taken. The author found here a remarkable number of species.



A NEIGHBORLY GROUP OCCUPY A MANGROVE TREE

Here we have, at the top, a great American egret; below, on the right, a roseate spoonbill, showing the beak that gives it its name; and on the left a Louisiana heron.



A BLACK-NECKED STILT VISITS TAMIAHUA LAGOON
Many breed in the western United States, but go south in winter.



A BLACK MAN-O'-WAR BIRD GUARDS HIS WHITE YOUNG
They look alike despite their color difference. Note the hooks on the bills.



THE COMMON IGUANAS ARE TABLE DELICACIES

These great lizards, three to five feet long, live among trees and on rough ground in tropical Mexico. In many places they are much prized as food, their flesh resembling that of a chicken. The photograph was taken near the Tamiahua Lagoon.

specimens. John said that he preferred being a live but hungry guide to becoming a well-preserved specimen.

Each evening I went forth to set out the flashlights, while my two companions were busily engaged in taxidermy or drawing. It was here that I learned of the infinite care with which Fuertes insured the accuracy of his subsequent paintings.

After making a rough outline of one of his specimens, showing its dimensions, he colored in only those parts of the drawing where the tints were perishable, such as the bill, eyes, iris, and the iridescence of the head and neck, if any, and the feet and legs if these parts were unfeathered. Since such careful methods guaranteed that his pictures were true to life, they can often be studied by ornithologists to better advantage than can the skins of specimens in museums or private collections, for in the latter many of the colors fade or darken as time goes on.

Swarms of mosquitoes appeared at sunset one evening when we were on our way back to Tampico, and continued active until morning. The tent John and I occu-

pied had no mosquito netting; and, after fighting the pests until midnight, I sought relief in the Chapman tent, which with its floor cloth, netting and two collapsible cots, was much more luxurious than those I usually had in my one-night camps.

A NEW TROPICAL FEVER

Lifting Chapman's mosquito net, I quietly crawled in, and found a good place on the floor cloth between the two cots. I had to move a tin plate holding a smoldering pile of insect powder. This I quietly shoved under Fuertes' cot.

Soon the sleeping artist became restless and finally sat up, calling to Chapman that he did not feel well, and that he feared he had contracted some strange fever, his hips especially being affected. This was a new disease to Chapman. Telling them that I had "a prompt and infallible remedy," I pulled the now blazing fire from under the cot.

The belated trip to Mexico had been made none too soon, for shortly after our departure insurrections broke out in most parts of the country.

CHAPTER X

Days and Nights on Gatun Lake, Canal Zone

WHEN information was received from Panama that the great basin for holding the waters of the proposed Gatun Lake had been completed by the construction of the long embankment at the north end, which closed the only gap in the rim of hills left open by nature, it seemed to me that the time had come to study and record the effect this disruption had produced on the wild life.

Month after month the gathering waters of tributary streams slowly covered the lowlands, crept up the wild, tangled valleys, drowned the mighty forests and the rank tropical jungles, flooded out native villages and destroyed scattered plantations, marooned such wild creatures as the monkey, ocelot, jaguar, peccary, armadillo, and sloth on hilltops unexpectedly converted into permanent islands, submerged the mud flats on which dwelt the herons and the ibises, drove the deer, tapirs, iguanas, and monster snakes through the rising water to less hampered retreats, and opened up a new and larger home for the cayman, or American crocodile, and the stream-confined fish.

Although all this necessarily represented a transitional condition, in which organic decay and the dispersal of wild life marked a definite break between the past and the present, yet in the very processes of transition there would be much of present interest and possibly of future value.

TWO HELPFUL OFFICIALS

On February 23, 1914, accompanied by C. J. Anderson, of northern Michigan, who had been my guide and camp assistant on many former expeditions, I landed at Colon. I remained in the Canal Zone until April 3. H. E. Anthony, of the American Museum of Natural History, New York, and later curator of mammals of that institution, met us on the dock and accompanied me as my guest while he was engaged in collecting specimens of mammals for the museum. My two companions proved to be congenial for such an expedition, and their cooperation added greatly to the enjoyment of what constituted the most novel and interesting of my wilderness experiences.

Promptly after my arrival I presented a letter of introduction from the Secretary of War to Colonel Goethals, then Governor of the Canal Zone. He received me cordially and displayed his usual keen interest in the promotion of scientific investigations in that region.

Since he was soon to go to Washington, he introduced me to Colonel Gorgas, notable for his success in controlling yellow fever and malaria, an achievement that changed the Canal Zone from one of the most unhealthful to one of the safest tropical districts in the world. The Colonel allotted me quarters at Gatun and in other ways materially facilitated my work.

ADVANTAGES OF A HOUSE BOAT IN COLLECTING AND EXPLORING

Many years' use of a house boat in the wilderness about Lake Superior had demonstrated to me the great convenience of such a movable habitation and its superiority over tent or cabin in most places accessible by water. In the tropics such advantages, I felt sure, would be tenfold greater.

Before we started for Panama we had planned to convert a small scow or flatboat into a house boat by merely erecting on it a frame that would support a canvas roof and wire netting along the sides—a simple structure that would exclude the sun and rain, and prevent visits from troublesome insects. This house boat we would tow from place to place with a swift and powerful launch, and we could use the launch for extended daylight excursions.

On arriving at Gatun on the lake, however, we found that all suitable scows were in continuous service by the Government, and only some that were too bulky for our use were available. Fortunately, we were able to convert a floating boathouse, in which a launch had been berthed, into a comfortable craft.

It was 9 feet wide by 30 feet long, and had a zinc roof and a covered tool house at one end, excellent for storage purposes. The sides and front were open. By putting in a floor, building a V-shaped prow at the towing end, and tacking on screening between the roof and the floor, we had a boat that was superior to the kind we



FAIRY GARDENS DRIFTED BY

Floating logs were a mass of long-leaved plants and slender reeds, surrounded by an exquisite display of blue-tinted and fragrant water hyacinths.

had originally sought, except for its heavy draft and a deck so low that it would be awash when the boat ran into a head sea.

While our improvised house boat was being made habitable, we made several excursions by motor boat, mainly up the Gatun and Chagres valleys. One of the canal employees at Gatun could take a launch at full speed through densely timbered districts, swerving here and there with wonderful skill, and he was seldom in doubt about direction.

Gatun Lake, with a surface elevation of 85 feet above sea level, is estimated to cover 164 square miles. It extends not merely over the previously existing swampy ground of the Chagres Valley, but so far above the floor of the lowlands as to penetrate for miles between the hills, forming estuaries, lagoons, and ponds. Rapid, un-navigable streams have been changed into deep, sluggish rivers, and hilltops con-

verted into beautiful islands, some of them miles in length. The thousands of acres of flooded and fallen timber into which stretch or circle narrow necks of land virtually preclude any accurate estimate of the actual shore line of the new lake.

SHORES UNSURVEYED

Apparently no one in 1914 knew the size, shape, or location of much of the partly submerged lands; nor can satisfactory surveys now be made at the water line without clearing a hundred-mile line of dying trees and bushes. Even a five-foot fluctuation in the level of the lake's surface, which may be expected between the dry and the wet periods, will necessarily change to a considerable degree the superficial area of the lake and the lines of the shore.

Some day, however, the warm and ever-present waters will destroy the obstructing

forests, and then the half-shrouded lake will glisten, near and far, in the tropic lights; while the surrounding shores, each bay and promontory, and the islands, big and little, will be defined by a new and permanent border of bamboo and other semi-aquatic growths.

At the time of our arrival the lake had risen to its full height; island after island and point after point had sunk out of sight; and the steady diurnal winds of the Caribbean Sea, whirling across the narrow, low crest of the embankment, lashed into life within a few yards waves that ever increased in size in the long course down the lake.

LIKE A WORK OF NATURE

As one gazed across the broad expanse of water, with its ruffled surface, it was difficult to realize that the lake was the recent creation of man and was responding for the first time to the action of the tropic winds.

Once when we were going after gasoline, the launch encountered a heavy head sea in mid-lake, and because the small pump was insufficient to take care of water shipped from the breaking waves, the boat nearly filled, and the engine went out of service. In consequence we drifted in peril of being wrecked by a collision with some tottering tree or buried beneath a falling top brought down by the impact.

Like most natives of the Southern Hemisphere, the Indians of Panama, when using the interior waterways for travel, employ the dugout, or *cayuca*, which they are expert in poling or paddling through the swiftest streams. On the first flooding of the lake it was easy for them to reach the construction towns along the shore in boats heavily laden with fruits and other products, but as the waters rose and the wind and the waves began to exert their full force, it was discovered that not one among them all knew how to handle a canoe safely under such conditions. Now the Indians paddle the lake in the stillness of the night or dodge by day in and out through the flooded forests near the shore.

Eventually skilled canoemen, perhaps with canoes of more seaworthy construction, will be able to buffet the waves; and these picturesque craft will be seen from the great steamers, gliding across the white-capped surface through waters that are insignificant to ships just from the tur-

bulent waters of the adjacent ocean.

Probably in no other country in the world is there such an interesting area of original timber covered with deep, still water. Here are slowly dying trees, containing great pendant nests of termites isolated and doomed to slow starvation.

Here are trees that died when the area was first flooded, and others that

are still green and apparently vigorous, with roots and trunks that have been under water for several years. On the decaying branches grow many beautifully colored orchids, tillandsias, ferns, vines, and mosses, replacing for a time the lost foliage and tropic blooms. Upright stumps and floating logs are green with long-leaved plants, and in the intervening pools are purple clumps of drifting water hyacinths (see page 258).

ISLANDS IN THE MAKING GO FLOATING BY

Here, too, are floating islands, with waving grasses and slender reeds, seemingly destined to live forever, which, when anchored by projecting snags or hemmed in between tree trunks, will gradually become wide, tremulous bogs, unsafe alike for man and all sharp-hoofed animals. They will be places of sunshine and of comfort, however, for the coming cayman, and refuges and feeding places for the herons, ibises, and other water birds, long exiled by the shoreless forests. These birds will spear numberless little frogs and lift many a fish from along the ragged edges.

Day after day we explored these unknown wastes, ever alert to avoid the sudden fall of treetops and massive limbs, weakened by inward decay or by heavily burdened masses of parasitic plants. Twice we were nearly overwhelmed, and



MAROONED BY FLOOD

The termites in this nest in the inundated district were still active, but doomed to slow starvation (see accompanying text).



THE CANAL ZONE AND SURROUNDING TERRITORY OF THE PANAMA REPUBLIC

This map shows the relocated railroad; the canal route; Gatun Lake, covering 164 square miles; and the portion of the impounded water extending beyond the zone, with the watershed and tributary streams still under the exclusive jurisdiction of Panama. At the time of the author's visit one-third of the lake and all the flooded valleys contained much standing timber living and dead. Navigation through half-submerged forests was difficult but the house boat proved seaworthy under trying conditions.



THE ISTHMUS OF PANAMA BEFORE ESTABLISHMENT OF THE CANAL ZONE

This map shows the former route of the Panama Railroad, the several watercourses, and the valley basins later occupied by Gatun Lake, with the location of the larger native villages therein. Comparison with the map on the opposite page will reveal the extent of the changes wrought by the impounding of the water. Inhabitants of the towns in the flooded area, once able to navigate their crude craft everywhere, were baffled by the winding channels among half-submerged trees. The author and his companions found them useless as guides.



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IN THIS FLOODED FOREST OF THE TRINIDAD AN IGUANA CLINGS TO AN UPRIGHT STUMP AND A WHITE EGRET SITS ON A LOG
The new lake of this region has now an extent of 164 square miles and a depth in places of 70 to 90 feet. At the time the photograph was taken the inundation had not driven away or destroyed animal life.

once the camera and flashlight at the edge of the shore were buried out of sight.

Because of the anticipated encroachments of the lake, the Panama Railroad along the Chagres Valley (as shown on the maps) was relocated, but most of the foot trails were obliterated, and the narrow, well-defined canoe routes were lost in a maze of flooded forests, the tortuous channels being no longer indicated by wooded banks or rapid currents.

A SWIFT RIVER WAS LOST IN THE FLOODED FORESTS

In the estuary formed by the flooded valley of the Trinidad there was no suggestion of the swift stream of former years, once navigable for many miles in a canoe; for now the broad, stagnant, forested waters were covered here and there with floating vegetation and driftwood that often blocked the old route and made travel uncertain. One had to resort to the compass, for here no land was visible, no blazed trails or flowing waters indicated the direction. One might be lost for hours while trying to locate the temporary anchorage of a launch or house boat.

The timidity of the natives in exploring these flooded forests was in keeping with their fear of the open lake, and as guides we found them quite useless for reaching hunting grounds by boat. They were accustomed to following the ancestral trails and streams, and knew nothing about a compass or the direction indicated by the prevailing winds or the position of the sun.

Late in the afternoon of March 6 our improvised house boat was ready; and, towed by the launch, it drew up to the wharf for our outfit. Such a strange-looking craft, the first of its kind on Gatun Lake, excited considerable interest among the natives and the canal employees, who half an hour later watched us depart with the launch owner, Captain Brown, at the wheel. Our destination was the Trinidad River, several miles up the flooded valley. We were to enter a *trocha* leading to a new plantation, three miles within the flooded forests, through a narrow lane that had been made by felling the larger timber before the coming of the lake.

Of the thousands of employees about the locks none except our pilot had ever visited the plantation, for this particular region was regarded as a most likely place

in which to get lost, a fact of which we were warned by the resident engineer. A heavy but favorable sea was running, and as the waves surged harmlessly along the low deck we wondered what would be the rate of speed or the condition of the boat were we obliged to head into it.

We now had all the comforts of a commodious yacht, much freer ventilation, and a continuous opportunity to view the landscape or wild life from the open sides. There was plenty of room to store the bulky outfit, as well as pleasant quarters for identifying and preserving the material collected.

Cots and hammocks for beds, a large oil stove, a 30-gallon tank for pure water, a long table hinged to the side of the boat for the serving of meals and for use as a work-bench completed the equipment.

On a house boat one escapes the cumulative annoyances connected with breaking camp every few days. There is no repacking of fragile or loose articles or selection and clearing out of new sites in the ever-present brush, where giant vine-tangled trees, too formidable for the ax, exclude the light, air, and every outlook, and convert the jungle camp into a gloomy hot-house, surrounded by prickly plants and subject to raiding ants in daytime, fever-bearing mosquitos at night, and vicious red bugs and ticks at all times.

NAVIGATION IS BY BOATHOOK ON SHORT CUTS

Before dark the interior of the house boat was put in order, an operation that was interrupted now and then as the wheelsman took a short cut through the dead timber and all hands with boathooks and oars assisted in keeping the boat clear of the trees and floating logs. Several hours after sunset and under the light of a half moon, we reached the nearly submerged point that marked the entrance to the valley of the Trinidad.

Here had once flourished the native village of Escobal, now covered except for several huts on top of the ridge (see page 264). In one of the huts lived an enterprising Chinese, who made a poor living selling groceries and a better one dispensing intoxicants. He was safely located a few yards beyond the zonal line of Federal prohibition.

By previous arrangement the Chinese



MANY A NATIVE VILLAGE ON GATUN LAKE IN 1914 HAD TO BE ABANDONED
Flooding of the basin wrought havoc with wild life, too, cutting off the food supply (see text, page 259).



THE HOUSE BOAT ON GATUN LAKE WAS COMFORTABLE

This view shows the use of the living quarters by day for the preparation of specimens of birds and mammals and the other indoor work. The explorers were protected from insects.

had engaged two native guides for us; and with these aboard we promptly continued on our way in order to reach the plantation before the setting of the moon. Seated within the house boat and facing the open side, we could watch the course of the boat through the tops of the tallest trees of the dead forest. The deep waters had destroyed or covered many of the smaller trees.

Running at low speed, we were several hours crossing. By a combination of good luck and skill Captain Brown found the entrance of the *trocha* just ahead, although he was guided only by the knowledge he had of trees near the mouth. How the house boat ever traversed this narrow and more or less blocked passageway will always be a mystery to me, for later, when running in daylight with the launch, we often went astray or fouled on snags a foot or two below the surface.

JUNGLE TOO HUMID TO BURN

At midnight, in rounding a turn, we heard the barking of dogs and saw the glowing embers of scattered fires, where cut timber had been stacked and then burned continuously during the dry season. This condition, which I had not expected, I feared would alarm the wild animals of the neighborhood. Unlike northern animals that are partial to "burnings" and tender new-growth vegetation, these creatures seemed likely to abandon a region unexpectedly covered with smoke and disturbed by crackling flames. In the dense and humid jungles fires are rare and seldom progress very far, even with the aid of man.

After our house boat had been tied up to a large tree a few yards from shore, we were visited by the native superintendent and given a generous welcome. Because Captain Brown was anxious to return to Gatun before the morning wind had roughened the lake, he left at once in the launch



THE HOUSE BOAT WAS ANCHORED OVER THE FLOODED VILLAGE OF ESCOBAL

Note the floating islands near shore. These become of great size when permanently held stationary by snags and dead trees.

with Anderson, who was to bring the boat back the next day. Less than a mile away he encountered a mass of floating logs, and the moon being below the horizon he was compelled to stop until daylight.

At sunrise the next day flocks of chattering parrots flew over us, and occasionally a pair or two alighted on the higher trees and peered down on the half-screened house boat. Frequent shots from the cabin in the clearing proclaimed doubtful additions to the larder. Nothing was spared by the native hunters. There were no game laws outside the Zone, and no effort was made to preserve even the ornamental birds of the country.



RESCUED FROM A FLOODED FOREST

The author took a flashlight of this nocturnal monkey which he had saved.

The well-earned outings of the canal employees were too often signalized by their using the harmless, nongame animals and birds as targets, until Colonel Goethals took measures to prevent such thoughtless destruction.

While we were breakfasting on the house boat, a strange sound, rising and falling in a torrent of guttural notes, came from the hills to the westward. It was our first greeting from the "black howler," the largest of the South American monkeys, a species whose uproarious conduct, whether in tribal conversation or in protestation against man or the weather, was always a source of astonishment to us thereafter.

THE "BLACK HOWLER" MONKEY MAKES THE WELKIN RING

My friend Fuentes, the bird artist and naturalist, whose realistic mimicry of bird notes was on a par with the fidelity to nature of his brush, declared that the noise of the "howler" is by far the most striking sound to be heard in the American tropics. It is "a deep, throaty, bass roar, with something of the quality of pig grunts or of the barking bellow of a bull alligator or an ostrich. The noise is as loud as the full-throated roaring of lions, and its marvelous carrying power was frequently attested when we heard it from the far side of some great Andean valley."

It is a popular belief on the Isthmus that the "black howler" is an infallible weather prophet. So far as we could discover, it was only when the clouds blackened overhead and the first preliminary drops began to fall that this prognosticator considered it safe to commit himself to a definite forecast of approaching storm.

About 10 o'clock Mr. Anthony, carrying a gun and accompanied by his guide with

a pack of steel traps, left for the only open trail in the neighborhood, one leading to an older plantation bordering the lake on the far side of the promontory. I went in another direction, following a dry creek bottom, to select places suitable for the taking of flashlight pictures. The bait for luring the animals to the chosen localities was to be the freshly skinned carcasses of animals trapped for specimens.

It may be noted here that the only natural foot-trails available during the dry season are the creek bottoms, which have been cleared of all underbrush and fallen trees as a result of the torrential rains that fall during eight months of the year.

WILD LIFE SEEKS CREEK BEDS

It is in these creek bottoms, also, that many of the wild animals, large and small, seek easy routes of travel; and here they come to quench their thirst at the small pools and pot-holes scooped out of the soft sandstone formation of all the creeks. The predatory species naturally come to prey upon the smaller animals that seek this favorable ground.

On returning at noon, the trapping party discovered a band of "black howlers" passing overhead, with a result described in the collector's notebook as follows:

"I felt a pang of regret at silencing one of the 'howlers,' but since a specimen was needed, I shot the foremost and heard him crash through the limbs to the ground. Pangs of a more effective source were experienced when my native boy and I attempted to retrieve the monkey, for he had fallen through a bee's nest the size of a bushel basket and we found the nest too late to avoid the consequences."

After the coming of darkness the specimen, a fine large male, was recovered, with the aid of a lantern, and brought to the house boat (see page 265).

The following morning the traps yielded only some small rodents, while the runways, formerly used by larger game, showed scarcely a track—plain evidence that the heavy smoke from the clearing had frightened them away.

This circumstance compelled us to make long and hard trips into the more-distant forests, in which trails had to be cut with a machete, foot by foot. The process resulted in our amassing a wonderful collection of ticks and red bugs and other insect pests, which bothered us until the trails



IT KNOWS WHEN A STORM IS APPROACHING

The black howler, the largest of the Panaman monkeys, is looked upon by the natives as a weather prophet, its loud, long, and reverberating howl being most frequently heard just preceding a heavy rain, but too late to give useful warning (see text, opposite page).



THE MARMOSET MONKEY HAS HAIR LIKE SILK IN SHADES OF BROWN AND GRAY
It makes a beautiful and attractive pet. There are five species of monkeys in the zone, from the black howler, the size of a small ape, down to the little squirrel monkey.



SHE WAS RESCUED FROM A FLOATING ISLAND WHEN A FAWN

This female white-tailed deer might have perished, as did many of her kind, had not a Good Samaritan brought her in from the flooded area.

had been cleared for a day or two. It was our later experience here and elsewhere that the jungles of Panama are abundantly supplied with a great variety of wild life.

The explorations of Major E. A. Goldman and others in Panama, the Canal Zone included, have shown the existence in that region of about 50 kinds of bats and more than 100 species of other mammals, among which are nine species of monkeys.

As in most tropical areas, fur bearers are scarce in Panama, the continuously warm climate not causing the growth of the warm coat of fur so usual among northern animals. Only the otter and the rare water opossum in this region seem to develop a coat that can be classed as fur.

A WAIF ON GATUN LAKE

For centuries the valleys now occupied by Gatun Lake had been the home or feeding places of many wild animals, especially noteworthy among the larger ones being the tapir and the deer. In the fall of 1911

the rising waters began to drive the two species of deer from the bottom lands, where the thickets and more tender vegetation had afforded the best of shelter and of food. Some sought the ridges and other elevations near by, unaware that within a few months these refuges would become isolated as islands or would be wholly submerged by the rising lake.

About this time Captain Brown had made a trip in his launch exploring the new avenues for motor boats in a territory in which he had hunted for years afoot. In passing some matted drift composed of dead vegetation, which under the force of the wind had just been pushed from a recently flooded island, he noticed lying fast asleep thereon a beautiful little fawn. It was only a few days old, and the debris had been its cradle within the flooded timber.

Now, separated forever from its mother and drifting in the open lake, it was likely to starve, drown, or become the prey of an



THE HOUSE BOAT CRUISES IN THE FLOODED FOREST OF GATUN LAKE

It was because of the flooding of the Gatun and Chagres valleys by the huge dam at the Gatun locks, thus causing abrupt changes in the faunal conditions, that an expedition was undertaken (see text, page 257).

eagle or the cayman. The captain took it aboard and added it to his collection of native animals at Gatun. Raised by hand and kindly treated, it reached maturity and became the favorite pet of the canal village (see illustration, opposite page).

A few months later, while on another expedition in the same region, the captain kept a good lookout for other marooned animals. One day, in an upper crotch of a large tree surrounded by water and situated a considerable distance from dry land, he observed a round, furry object. As the launch approached, the ball unrolled itself and disclosed a small monkeylike creature, with bulging eyes that suggested a lemur. Captain Brown felt sure that this was the rarely seen nocturnal species known as the owl monkey.

Since this was a rare find and afforded another opportunity to save an animal in distress, the captain tied the launch to the tree and made an effort to slip a noose over the animal's head by means of a boat-hook.

His effort proved unsuccessful. He then placed a ripe banana invitingly on the bow, and retired to the stern to await results.

In a few minutes the little animal came down the tree, leaped on deck, and eagerly began devouring the fruit. It was evidently on the verge of starvation, for it permitted the rope to be cast off without showing any desire to leave its food and seek its former retreat. An hour later the little monkey was placed without difficulty in the same pen with the fawn.

SHOOTING A BOA CONSTRICTOR

Afterward it sought a shelf on the rear porch, where during the daytime it was concealed by boxes and coils of rope. True to its nature, it was never seen in the daytime, except when purposely disturbed, but after dark it was very active (see page 257). On chilly nights it would seek the sleeping fawn and curl up on its back for warmth. My introduction to this interesting animal occurred later, when I tested its



NATIVE PANAMANS GO TO SEA IN CAYUCAS, OR DUGOUTS

These craft vary in length from 8 to 35 feet, and each is cut from a single tree. They bring produce to market, often being loaded with sugar cane cut in sections 8 to 10 feet long.



A GATUN LAKE IGUANA TAKES A SUN BATH

This species, the giant lizard of the South, is considered by the natives a real prize, for its flesh, when properly cooked, is said to taste like chicken.



HERON FISH AT A HEADWATER STREAM

As the shores of Gatun Lake open up, they will be a favorite resort for all wading birds. Floating islands will become stationary and wild life of many sorts will occupy them.



A FEMALE OPOSSUM OF PANAMA NURSES HER BABES

These relatives of the well-known Virginia species have the same habit of carrying the naked and undeveloped young attached to their teats within a pocketlike pouch on the abdomen.



TWO NOCTURNAL RAILS USED THE DRY CREEK BOTTOM WHERE THE FLASH WAS SET
Like the opossums, they fired it repeatedly, pulling on the string whether it was baited with fruit
or meat (see text, page 274).



THIS SORT FIRED MOST OF THE FLASHES

This particular opossum is the commonest of several varieties encountered in the Canal Zone. It proved a serious obstacle to night photography (see text, page 274).



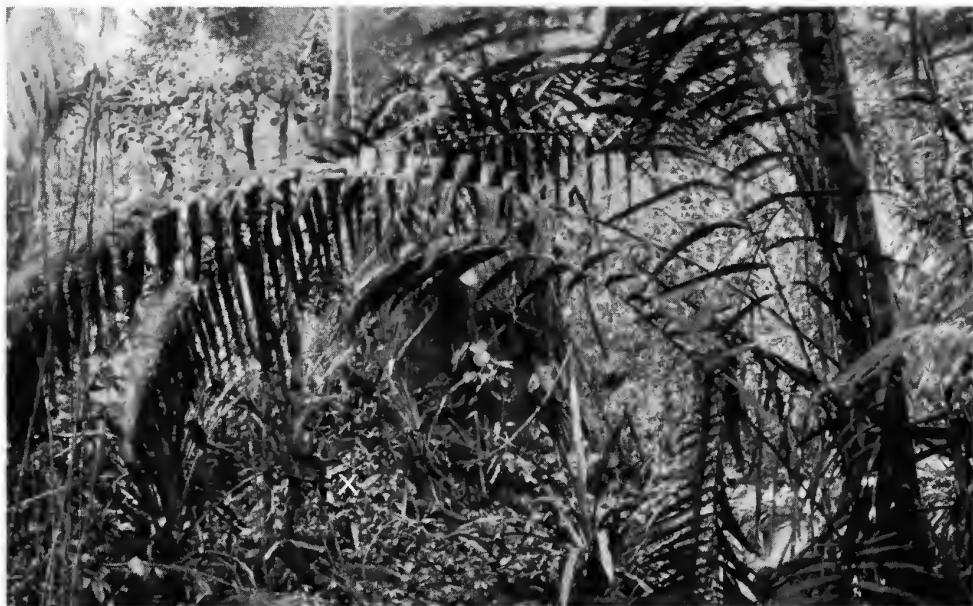
AT FIRST GLANCE IT LOOKS LIKE A PIG

The long, naked tail, however, shows the subject of this flashlight picture to be a member of a common species of Panama opossum.



ANOTHER OPOSSUM FINDS THE BAIT

After these ubiquitous animals had fired most of the author's powder set to flashlight more important subjects, the statement which heads this legend was uttered in disgust (see text, page 274).



HERE THE AUTHOR ALMOST ACHIEVED A TRIUMPH

In this creek bottom, arbored over with giant ferns and swaying vines, the flashlight was fired by a jaguar. However, the camera outfit (marked X, lower left center) was so far from headquarters that the plate was ruined by moisture before it could be developed (see text, below).-

eyes to see whether they would shine under an artificial light.

Most of the process of the dispersal and isolation of wild life had gone on before our arrival. Through the assistance of hounds we obtained some fine specimens of the larger animals on several islands where deer and peccaries were still abundant, though more or less preyed upon by jaguars and ocelots. One afternoon when cruising through a forest of gaunt, dead trees, in an area in which the water was fully 20 feet deep, we were surprised to see a large boa constrictor sunning itself on a limb not much above the surface of the water.

A BOA CONSTRICTOR CAUSES SOME COMMOTION

Since this snake was regarded as a good museum specimen, we put a rifle ball just back of its head. With a convulsive movement the snake hurled itself toward the bow of the launch, but fortunately it slid into the water. Only a crimson circle on the surface and a string of bubbles marked its way to the bottom where it was beyond recovery. Whether it had sought a dead tree in the open water as being the only available basking place in this deluged

district or had found some form of prey unknown to us was hard to determine.

Although I had previously been successful with flashlight photography in southern climes, this method proved to be difficult of application in Panama. The country was alive with opossums, ranging in size from that of the Virginia opossum to that of a mouse (see pages 271, 272, and 273). The moment darkness fell I could hear the reports from the scattered flashlight machines and always there was the probability of their having been fired by marsupials. As if this annoyance was not enough, many a flash was sprung by a species of night rail, by large rats or flying bats (see page 272), and even by decaying vegetation dropping from the forest tops.

In the daytime, the ever-present buzzard soon associated with a feast the green tin boxes covering the cameras, and whenever meat was used as bait, it became necessary to delay setting the flash until dusk was beginning to gather.

But the worst obstacle of all was the extreme humidity. Plates left exposed in the camera for more than two nights and developed at irregular periods became so mildewed as to be worthless.



A PACA BITES A MANGO AND TAKES ITS OWN PICTURE

One of the largest of the existing rodents, this creature is exceeded in size by the closely related capybara alone. It is an animal of nocturnal habits, and therefore can be photographed only by means of flashlight apparatus set at night.

Once when the flash was fired by a jaguar at a considerable distance from the house boat, the locality was visited too late for the plate to be saved, and all I had for the effort was the sight of the clawed bank caused by the big animal as it sprang away in terror when the dazzling, booming flash greeted its effort to carry off the skinned body of an opossum. Much the same thing occurred in the case of a tapir that was passing along a runway to the water.

Moisture-absorbing chemicals in the camera would have overcome this difficulty, but none was at hand. Undoubtedly flashlight photography is the ideal way of getting pictures of the larger-sized and mostly nocturnal animals of South America, where the dense brush prevents any possibility of daylight pictures unless the subjects can be cornered or treed by hounds.

On several nights I tried to get flashlight pictures of animals on the shore of Barro Colorado Island. We occasionally caught glimpses of glowing eyes back from the water's edge, but floating logs and tottering trees made the approach so difficult that before we could come within range the mysterious beast we were eager to photograph had always disappeared.

That the obstacles to flashlight photography with a set camera in the jungle can be overcome and admirable results obtained was demonstrated by Doctor Chapman on Barro Colorado Island several years after my visit there. In 1926 he built a winter cottage at the Biological Station established on the island, and devoted much time to studying the habits of the rich bird life of that delightful sanctuary. At the same time he observed the mammal life about him, and the tracks of some large species in trails cut through the forest excited his interest.

DOCTOR CHAPMAN SUCCESSFUL WITH FLASHLIGHT DEVICE

For many years he had been my close friend and a frequent guest, and had become familiar in a general way with the technique of flashlight photography. The conditions about him on Barro Colorado Island were so tempting that he procured the necessary equipment and used it skillfully enough to obtain a fine series of photographs of tropical animals that had never before been pictured at large in their native haunts.

Among these were such small game as agoutis and coatis, besides the collared and



Photograph by Dr. F. M. Chapman

IN MANY RESPECTS THE PUMA IS AN OVERGROWN KITTEN

These animals will frolic together or alone, fight sham battles, chase butterflies, or play hide and seek. This one is not full grown. The picture is one of Doctor Chapman's masterpieces with the automatic flashlight camera on Barro Colorado Island.

larger white-lipped peccaries and the tapir. The most remarkable of the collection were the pictures of the ocelots and the mountain lion journeying stealthily along the trails (see illustration, above).

Doctor Chapman's account in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1927, of his experiences in getting these

photographs should inspire others to make similar records of the rarely seen beasts that haunt the jungles of the American tropics. There is in these virtually unknown fastnesses a wealth of material for study by naturalists, and a photographer who could obtain satisfactory pictures there would contribute a valuable service.



CHAPTER XI

Further Observations in the Canal Zone

ON OUR Panama trip we devoted considerable time to studying the reactions of the eyes of mammals, birds, and other animals to bright light at night. Naturally, many of the species tested were those available only in the tropics.

Up to this time I had not found a member of the primates with eyes that reflected light, for all tested were diurnal species, like man. In several countries there are species of monkeys that are nocturnal, but I could never find one in zoological collections. Therefore, it was with great interest that I tested the eyes of the little owl monkey, whose rescue from a flooded forest has already been mentioned.

Turning the lantern toward the monkey as it sat on the upper edge of the porch one dark night, I saw its eyes glisten like two brilliant diamonds. After I had taken a flashlight picture of it, it became so wild that I could not approach it for further study. Since this particular species of monkey has not a prehensile tail, and since its eyes and general features resemble those of the lemur, a strictly nocturnal animal, it may represent a connecting link between the monkeys and the lemurs.

In the North I had discovered that the eyes of one species of nighthawk, belonging to the goatsucker family, would shine brightly under the light. While at Gatun, I at once noticed that the nighthawks circling about the electric lights after insects had brilliant eyes.

A LIGHT CAUSES A BIRD TO BE MISTAKEN FOR A CAT

Mr. Anthony, "headlighting" in the forest for specimens of the cat family, saw a large pair of brilliant red eyes glowing from the top of a tree. He fired with the expectation of getting an ocelot or a similar animal. Instead of a heavy body crashing through the branches there was only a slight swish. Looking under the tree, he found that he had killed a large goatsucker, one of the largest of all the nighthawk family. He was disappointed in his failure to bag the large quadruped he had expected, but the result of the shot showed that at least certain other members of the group of nocturnal birds possess a *tapetum* (p. 179).

We discovered, also, that the eyes of the larger species of southern rodents, such as the agouti and paca, could be easily shined at night. Since the northern rodents, with the exception of the rabbit (which is not a rodent although popularly classified as such), do not have shining eyes, it is possible that this physical characteristic might be used to some extent as a basis for distinguishing a suborder of rodents.

On the Upper Chagres we found one species of fish that apparently fed mostly at night. Under the light its eyes would glow with the same brilliant red as in those of the cayman, another night feeder.

THE AUTHOR'S THEORY OF THE TAPETUM CONFIRMED

While the results of our experiments in Panama enlarged our list of the number of species having reflecting eyes, they confirmed my opinion that the possession of the *tapetum* is directly associated with night vision, and that the brilliancy of the reflection corresponds to the animal's need of such a faculty in defense or aggression.

One day Mr. Anthony, scanning the treetops for a shot at a squirrel, was nearly knocked over by a big boar peccary. He fired at it with small shot, and it rolled over dead a few feet away.

At the same instant his Indian guide at his elbow uttered a cry of terror. A big jaguar had sprung up and roared in his face. So intent had this beast been on following the peccary's trail that it had ventured close to the hunting party. It sprang away in a line with the guide, so that a shot could not be fired at it without endangering his life.

This adventure provided us with fresh meat and a good museum specimen. That night Anderson, whose bed was on the floor between our cots, was restless, the usual indication that his daily supply of ticks had not been removed before he retired. When he held up several objects and inquired sarcastically whether they were "young turtles," his knowledge of entomology was enlarged. We told him that they represented a very large species of tick from the peccary he had skinned on the floor of the boat some hours before.



THEY ENTERED AN EERIE CAVERN

The low entrance to the bat cave on the Chilibrillo River opens into a series of long corridors and chambers more or less intercommunicating.



TRIPS WERE MADE UP THE RIO CHILIBRILLO TO VISIT THE BAT CAVES

Since palms never grow in water, something of the extent of the flooding of this region can be judged.



BLACK VULTURES CONSORT WITH TURKEY BUZZARDS

This is a common scene on the beach at Panama City. The tireless scavenger birds are of inestimable value to communities in tropical America.

Many years ago some large limestone caves were discovered near the Upper Chagres. They were the haunt of numerous bats, ranging in size from a small species only about 3 inches in length to the huge, so-called vampire, whose wing-spread may be two feet or more (see page 285).

Formerly it had been impossible to visit this section otherwise than by an uncertain trail that ran through the evercrowding jungle. After the main stream and its tributaries had been deepened by the back waters from the lake, however, the caves could be reached by launch in a few hours. Under the guidance of a former canal employee, an erstwhile trapper and market hunter, we made a trip to the caves on March 1.

After ascending the broad, inundated valley of the Chagres for some miles, we entered a branch called the Chilibrillo—narrow, deep, and tortuous and with no perceptible current. As the boat glided smoothly through the straight courses and swerved violently at the numerous turns, the overhanging shrubbery and the flooded palm trees on each side marking the bed of a stream formerly unnavigable for any kind of craft, we realized more fully how the new lake had opened up these canal-like avenues of travel into the very heart of the jungle (see page 278).

We had made a run of five or six miles when a current became noticeable. In a few minutes we came to a transverse ledge of rock with a slight flow of water rippling over it. This indicated the end of the trip by boat. While we continued our way by walking up the nearly dry bed of the

stream, it became plain to us that many animals had sought the higher ground as a refuge; for trails to the scattered pools came in from all directions, bearing the fresh imprint of tapir, deer, peccary, and agouti, and the occasional claw marks of the jaguar and ocelot. The frequent roaring of the black howler showed that this big tenant of the treetops was also abundant.

The grotesque toucans vied vocally with the noisy parrots, and the notes of the parakeets and the peculiar choruslike calls of the chachalacas produced an impression that I shall ever associate with the memories of the jungle. Turning to the right and ascending a creek bottom, we soon came in sight of the low entrance to the caves, encircled with ferns, vines, and flowering plants.

CLUSTERS OF BATS FESTOON WALLS

Lighting the lantern and stooping low, we entered a corridor leading to a series of interconnecting rooms with high ceilings and dark and grimy walls, relieved here and there by light-colored stalactites, the tapering ends of which dripped with limestone waters. In the central room, both on the walls and on the ceiling, were great clusters of bats segregated by species and, as later examination showed, according to sex (see illustration, pages 284 and 285).

A bunch some 10 feet square and containing hundreds of small bats was discovered on an end wall. The bats were only 6 feet from the ground and were particularly well situated for a flashlight picture. Our guide, filled with the enthusiasm of the occasion, unbuckled his leather belt,



A STREAM BED THROUGH THE FOREST HELPED THE HUNTERS

The visit being during dry weather, the party took advantage of this open route to set traps for mammals and cameras with flashlights.

and before we could anticipate his action, began lashing them. In a moment a surplus of specimens lay at his feet. The rest took wing and in bewilderment circled about the lantern.

Our next efforts were directed toward getting specimens of the larger bats, which hung from the highest domes and could be obtained only by throwing missiles at them. While picking up some loose pieces of rock for this purpose, we were startled by a flash and the reverberating report of a heavy rifle discharged by the guide in another misdirected attempt to aid us in our specimen gathering.

A few mangled and useless bodies fell, and then a black stream of bats circled

noiselessly overhead, creating a perceptible current of air as they flew continuously back and forth through the connecting caverns. Finally, they attached themselves to the roof and we were able to obtain a sufficient number for our purpose. I took a series of flashlight pictures.

FEW EXPLORE CAVES

Upon the large detached rocks were dozens of big black beetles, either nocturnal in their haunts or accustomed to feed on the vermin or excrement of the bats. A careful examination of these caves indicated that they did not belong to the group formerly discovered by visiting Americans. They contain a vast deposit of bat guano, and since they are near water transportation this supply may become of considerable value as a fertilizer.

The animal in which I was particularly interested on

this trip was the white-tailed deer of the Canal Zone, a distant relative of the Virginia deer. The several species of the white-tails with their geographic races form by far the most wide-ranging group of the American deer, extending as they do from coast to coast and from Canada southward to Brazil and Peru.

In the Canal Zone as well as elsewhere in the tropics the whitetails frequent the borders of the forests and the edges of open savannahs and clearings. They come into the open usually at night, but sometimes they venture out about sundown or very early in the morning.

In the North the mating season of the whitetail covers about 30 days in the fall,

and the bucks shed their antlers a month or so later. The fawns are born within a correspondingly 30-day period late in the spring. Such periodic and seasonable habits are undoubtedly caused and controlled in part by the rigorous winters and the supply of nourishing food which is obtainable at the period of fawning.

BREEDING SEASON OF DEER IN THE TROPICS

Even in the Gulf States the mating and fawning seasons correspond approximately with those farther north, for even there the winters are too severe to permit any material change. South of the Mexican border, however, especially from Vera Cruz southward, the breeding season is much extended and more irregular. In those regions there is virtually always a sufficient food supply.

On the Isthmus of Panama, which has a mean annual temperature of about 80 degrees Fahrenheit, and a variation of only about five degrees between the so-called summer and winter months, the periods of the rut, the shedding of the antlers, and of fawning are very irregular. There are at least nine months when fawns may be born; and antlerless bucks and those with antlers in different stages of growth may be found throughout the year.

It is an interesting and unanswered question whether this prolonged breeding season in the tropics does not result in many bucks carrying their antlers much beyond what would be the normal period in the North. I believe that the growth of antlers is purely a sexual manifestation, which



OUT OF THE FRYING PAN INTO THE FIRE

This boar peccary was shot when he was fleeing before a jaguar at Gatun Lake. Whether he ran on or stopped, he was doomed.

incidentally provides a weapon for battling with rivals; for in the North the antlers are shed long before the time when they would be of the greatest use against wolves and other predatory animals. Among the tapirs and many other large animals a prolonged breeding season is also usual, but among birds it is less marked.

The dense forests of the Canal Zone are inhabited by a little reddish-brown species of deer known as the brocket. It keeps so much secluded in the dense jungle, in which it makes its home, that comparatively few white men have seen it. The brockets form a group of tropical American deer that live in the heavy forests from Mexico to Brazil. Because of their retiring habits little is



BARRO COLORADO IS ONE OF THE MANY ISLANDS STUDDING GATUN LAKE

Official Photograph U. S. Army Air Corps

From the air one can best appreciate the primitive state in which Barro Colorado has remained. This island, in the foreground, has an area of about six square miles, and rises to an extreme height of 452 feet above the lake. As shown by the unbroken sea of treetops, it is densely forested and has been set aside by the Government as a sanctuary wherein the wild life of tropical America may be conserved and studied. The arrow points to the laboratory.

known concerning the characteristics and the life histories of these animals.

During and since the construction of the Canal many Americans as well as other people in the Canal Zone have hunted deer with dogs and by still hunting. Hunting clubs have been organized and considerable game is available to those skillful and persistent enough to find it.

Anyone who tries hunting in tropical jungles soon realizes that the hardships and difficulties are greater there than they are in the temperate regions of the North. Many of the game animals and the beasts of prey in the Zone present a strange appearance to a hunter new to the tropics.

No fully organized game laws are in force in the Canal Zone, but under its police powers the government of the Zone controls hunting through executive orders and by the requirement that every one wishing to hunt shall first obtain a hunting license. Shooting is forbidden within 100 yards of town sites and roads and within certain localities, and there are several other restrictions. Hunting by the use of artificial light at night is prohibited.

In general, birds with their nests and eggs, except the birds of prey, are protected; but there is an open season on ducks and waders, and on pigeons, quail, curassows, and guans. The last named are large, dark-colored birds of the pheasant family. They resemble hen turkeys both in size and proportions, and are often called wild turkeys by uninformed hunters. As a matter of fact, the guan has no near kinship to those familiar birds of the North, which do not range south of Mexico.

MOST NORTHERN WILD FOWL ABSENT

The southern range of the majority of the migratory wild fowl of the North does not extend to Panama. With the exception of three varieties of ducks—the pintail, the blue-winged teal, and the lesser scaup—no geese, brant, swans, or any of the other numerous species so common in the United States were seen by us or noted by careful resident observers.

This fact indicates that the Federal Migratory Bird Treaty with Great Britain, which has so effectively prohibited spring shooting in the United States and Canada during the northern flight, need only be supplemented by a similar treaty with Mexico in order to cover the main part of

the range of these valuable and rapidly vanishing birds.

For some reason tropical fresh-water lakes do not appear to favor the growth of the food plants necessary to support an abundance of wild fowl. In addition to the visiting ducks from the North, black-bellied plovers and a number of northern shore birds visit the Canal Zone during their migratory flights. A great blue heron wearing a band placed on one of its legs in Wisconsin has been shot there.

FISH AND FISHING

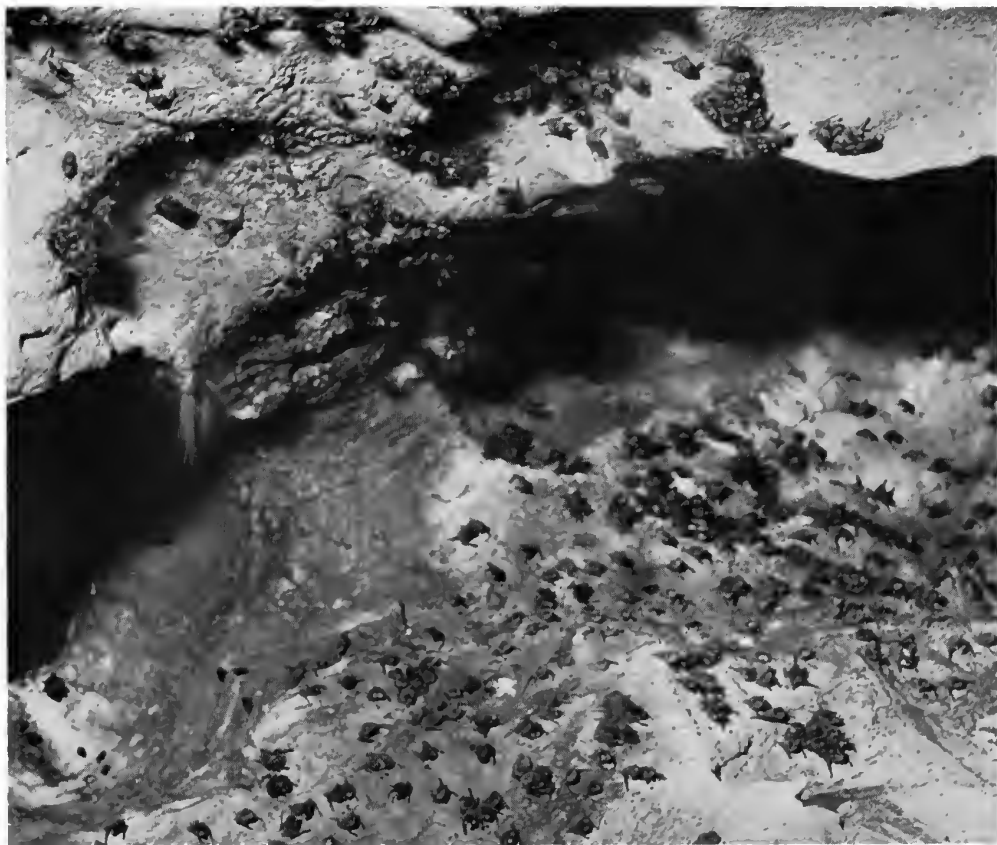
The waters of Gatun Lake in the vicinity of our house boat were plentifully supplied with a good-sized, coarse fish resembling the black mullet. We put into service a large line and our single rusty hook, and soon landed a dozen of these fish, averaging a pound or more apiece. They were only fairly edible, but served excellently for baiting the traps set to catch mammals and to lure animals to the neighborhood of the flashlight cameras.

These fish, though everywhere abundant in the lake, are not fitted to become a game species or to be a favorite on the table. There were also smaller fish that annoyed bathers by nipping them severely. These could be frightened away only by creating a vigorous commotion.

I was impressed by the lack of desirable native food fishes and the apparent opportunity to stock this great body of fresh water with some of our well-known species that would add greatly to the recreational opportunities of the Zone and make a welcome addition to the larder. This idea evidently occurred to others, for in 1916 and 1917 the United States Bureau of Fisheries planted in Gatun Lake young black bass, rock bass, sunfish, and catfish. In 1924 some additional black bass, together with crappies and bream, were placed there.

Little definite information is available concerning the outcome of these experiments, but in June, 1931, I was informed that the black bass introduced into a small lake on the Stilson plantation had greatly increased in numbers, and that large crappies had been caught in Gatun Lake. This indicates that to a certain extent at least some of our game fish might prove successful in Panama.

Thus far anglers in Gatun Lake have had poor returns from their efforts, but below



A FLASHLIGHT PHOTOGRAPH RECORDS LIKENESSES OF SMALL BATS

They were isolated by species and sexes, each species confined to a particular grotto, where it was found in hundreds. The bats of each mass were all of the same sex (see text, page 279).

the spillway of Gatun Dam there is good tarpon fishing, and about the submerged banks and around the islands on both coasts the sea fishing is excellent.

Our refusal to accept the proposals of European nations for an unfortified or neutralized canal, and the erection of the heaviest possible armament on the seaboard at both ends of the canal, become vain if it is possible to suspend the operation of the canal for months by the use of a few sticks of dynamite on the spillway, or if the Pedro Miguel locks can be destroyed by projectiles fired from slopes beyond the boundary of the Zone.

To protect the entrances to the canal by fortifications and warships while trusting to the supposedly enduring friendship of Panama or to the inviolability of the neutrality of the Canal Zone by other nations is much like locking the front and back doors

while leaving those on the sides open. In short the canal is far from impregnable unless fortifications or other means of protection are provided to guard the sides.

Fortunately, the terms of the treaty with Panama permit the safeguarding of the Canal Zone by the necessary extension of its borders. This has been done already about Gatun Lake and elsewhere in places that may be overflowed by waters raised by the creation of other reservoirs.

TREATY WITH PANAMA SAFEGUARDS THE CANAL ZONE

The danger that might arise within a zone extending only 5 miles on each side of the canal was so well recognized that on February 26, 1904, President Roosevelt proclaimed a treaty with Panama containing broad stipulations to cover possible future requirements.



THIS GREAT TROPICAL BAT SPREADS 26 INCHES FROM TIP TO TIP OF ITS WINGS

It is a giant of the largest species found by the author and his companions in their explorations of the caves near the Chagres River (see text, page 279).



HANGING BATS WERE FLASHLIGHTED BEFORE THEY WERE ALARMED

Clusters of these creatures ordinarily contain a great number of individuals, several hundred in some instances. The kind shown here is one of the larger of tropical American bats. The bats are strong and muscular and always ready to bite. The masses of them bear a close resemblance in form to the stalactites with which the walls and domed ceilings of the cave are covered (see text, page 280).



THE FLARE BANISHED THE PITCH DARKNESS

This was the method of photographing bats by flashlight in the Stygian caves on the Chilibrillo (see text, page 279). Since the powder used is exceedingly explosive, the expression on the face of the operator is not to be wondered at.

Because of the peculiar administrative requirements of the Canal Zone, and in order to avoid needless friction, the Government promptly proceeded to buy up every private holding within its limits. Since then private occupation of land within the Zone has been prohibited except under permit revocable at will.

A few necessary semipublic businesses, such as the Cable Company, have such permits and canal employees enjoy the use of little tracts for residences and gardens. However, it is not feasible to permit any considerable private development.

Early in the history of our connection with the canal much publicity was given to the potential development of agriculture on neighboring land in Panama. Up to 1931 this had failed to materialize.

Some development has taken place about David, in the province of Chiriqui, from which fruit and other products are shipped to Panama by boat. The paved motor highway extending from Panama City to David will no doubt aid in the growth of such businesses. This road forms a link in the great Pan-American Highway that is gradually being built to make possible motor traffic from the United States and Canada to the countries of South America.

U. S. MUST OWN ALL LAKE SITES

In the course of my explorations about the shores of Gatun Lake, a considerable part of which lies far beyond the five-mile limit to the southwest and to the northeast of the canal, I was deeply impressed by the necessity for the United States to have absolute control of it, and so expressed myself in

the NATIONAL GEOGRAPHIC MAGAZINE for August, 1915. Fortunately, the treaty with Panama permits necessary readjustments of the Canal Zone boundaries as required for purposes of its proper administration, control, and defense.

The drainage basin of Gatun Lake has an area of about 1,300 square miles. No high mountains exist there to send cool water into the lake; consequently its temperature is always warm, although, like the air above, it varies somewhat with the season. The temperature at the surface in July is about 87 degrees, and in January about 84 degrees. Near the bottom, at 44 feet, in July it is 76.5 degrees, and at 48 feet in January, 75 degrees.

The canal is dependent for its continued operation on the precipitation on the

Gatun Lake drainage and what water may be collected in the Chagres River basin above Alajuela. This makes it essential to observe the greatest care in noting and recording the rainfall on these watersheds and to provide for guarding any part of the lake basins subject to dangerous overflow or pressure.

WEATHER IN THE CANAL ZONE

In more northern latitudes we are always concerned about the weather and its numerous daily and seasonal changes; for these have a direct bearing on the welfare and comfort of practically everyone. Variations between daylight and darkness, and between heat and cold, the growth and decline of vegetation, and the slumbering of nature beneath a mantle of snow, all are factors that must be recognized in any program of human endeavor.

As was expected, in the tropics at Panama I found a much greater uniformity of weather conditions than in the North. The periods of daylight and darkness were nearly uniform in length. On February 25 the sun rose at 6.35 a. m., and set at 6.30 p. m.; exactly a month later it rose at 6.20 a. m., and set at 6.30 p. m. The average annual temperature of the Canal Zone is about 80 degrees Fahrenheit; in the two months I was there the temperature ranged from 72 to 74 degrees in the early morning, and from 84 to 88 degrees at



CABLELIKE ROOTS CARRY NOURISHMENT ALOFT

Many plants live on the upper surface of large branches of trees in tropical American forests, and some of them, lacking sufficient food in the humus there for their proper growth, send down long, threadlike rootlets, which finally touch the ground and firmly take hold there.

3 p. m. The highest recorded there is 98 degrees, and the lowest, 59 degrees.

Based on the relative amounts of rainfall, the year on the Isthmus is divided into two parts—a dry season of about four months (from January to April), and a wet, or rainy, season of eight months (from May to December). Although these sea-



NATURE PLAYS TRICKS WITH TREE TRUNKS

The author made a study of these queer formations at the north end of Gatun Lake (see opposite page).

sons are fairly well defined, there are some rains in the dry season and some fair-weather days in the wet season. The average daily period of rainfall during the wet season is said to be only an hour and a quarter.

The amount of rainfall varies locally, the heaviest occurring at Colon, on the Atlantic side, at which place it averages 129 inches annually, and the least at Ancon, on the Pacific side, where the average is only 71 inches. The heaviest rainfall recorded in 24 hours amounted to 12.25 inches.

I was surprised by the absence of thunderstorms while I was in the Canal Zone, for I noted often a feeling of humidity in the

air and clouds such as I had learned in the North to associate with electrical displays. Continued official observations have disclosed, however, that such storms are more numerous there than in any part of the United States. They are rare in the dry season, but average about 15 a month in the rainy season, a total of 100 to 140 annually. They are most numerous over the continental divide, and fewest along the Atlantic coast. These storms usually travel across the Zone from southwest to northeast as elsewhere on the continent, and seldom exceed 45 miles per hour.

THE CANAL ZONE FORMS A CROSS-SECTION OF TROPICAL LIFE

Although the several insular possessions of the United States contain many strange forms of plant and animal life, most of these are beyond the current of our domestic intercourse and are little visited by travelers from other lands. Wonderful as are our national parks, they can be seen by slight diversion from the customary lines of travel, and most of them are within the temperate regions with which we are familiar.

The Canal Zone, however, constitutes a cross-section of the tropical land bridge joining North and South America. It is the only portion of our tropical domain that is traversed by boat and rail on a main traveled route. It is a unique part of our public domain, and every citizen should have a feeling of personal pride and proprietorship in it and favor its improvement and beautification, even though few can see it.

The terminal cities of the canal—Colon and Panama—will continue to be objects of interest, but how refreshing and entertaining to all will be the trans-Isthmian trip, if along the way may be seen tropic growths in all their luxuriant beauty of foliage and bloom. There, too, efforts should be made to attract and show so far as possible an adequate representation of the local mammal, bird, and reptile life.

Since the settlement and the agricultural development of the Canal Zone are forbid-

den, the 10-mile belt across the Isthmus and its great extension about the shores of Gatun and Alajuela Lakes should take on the aspect of a great international park.

The rich tropical vegetation of the forest shelters deer, peccaries, tapirs, pacas, agoutis, jaguars, ocelots, mountain lions, opossums, spider and howling monkeys, marmosets, and a multitude of bats, together with many reptiles, including the boa and the cayman in the swamps.

Colonies of egrets might occupy the trees on secluded islands in the lakes. In places the noisy cries of macaws and parrots would break the silence, and the brilliant hues of trogons, toucans, tanagers, and other tropical birds would add their charm to the orchid-laden trees. An epitome of nearly all this already exists on Barro Colorado Island in Gatun Lake.

THE CANAL ZONE AN IDEAL SITE FOR A BOTANIC GARDEN

The Canal Zone is ideally situated for the development of a great botanic garden, such as the world-famous examples in Ceylon and Java. There, with the aid of an authority on tropical botany as resident director, it would be possible to bring together for scientific study and exhibition not only the useful and interesting plant life of the tropical Americas, but that of the entire world. Such an establishment would not only attract botanists from many countries, but would hold a fascinating interest for the growing number of travelers who are now passing through the canal each year.

I was so impressed by the richness of the flora and fauna about the shores of Gatun Lake, especially the mammals, birds, and reptiles, that it appeared to me to be an ideal place for a center of research by scientists. What my companions and I had seen in the course of our house boat trips would be negligible compared to what detailed study could discover.

In an article which was published in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1915, I voiced this idea and suggested some governmental action to bring this about. Whether or not this suggestion had any weight, it gave me the utmost satis-



THIS ONE HOLDS THE TREE ALOFT ON STILTS
Queer tree trunks in the forest at the north end of Gatun Lake fascinated the author (see opposite page).

faction when the following Executive Order was issued by the Governor of the Canal Zone and a copy of it was sent to me.

THE PANAMA CANAL, CANAL ZONE EXECUTIVE OFFICE

Balboa Heights, C. Z.,
April 17, 1923

To All Concerned:

Barro Colorado Island in the Gatun Lake area of the Canal Zone is hereby reserved for use as a Natural Park, subject to later arrangements for its development. This island is also known as West Island.

Hunting of game of all kinds is prohibited on this island except for strictly scientific



THOUSANDS OF TREES FESTOONED WITH GROUPS OF BRILLIANT ORCHIDS WERE
DYING IN GATUN LAKE (SEE TEXT, PAGE 259)



THE HOUSE BOAT WAS TIED TO DEAD TREE MANY MILES FROM DRY LAND

The open space gave sunlight, cooling breezes, and freedom from insects, and the deep, clear water invited the morning and evening swim. Fish of several species were very numerous, but were of little value. Since then bass and several other desirable fishes have been introduced, and some, at least, appear to be thriving.

purposes, for which a special permit shall be issued by the Governor or by his direction.

JAY J. MORROW,
Governor.

This action was taken on the recommendation of Dr. Thomas Barbour and others interested in tropical natural history, for the purpose of establishing a Biological Research Laboratory on the island. Doctor Barbour succeeded in interesting the National Research Council in the project; the first laboratory buildings were erected in 1924, and the station has ever since been conducted under its auspices. Undoubtedly the station owes more of its success to Doctor Barbour's tireless interest and financial assistance than to the efforts of any other individual.

This station is used every year by a group of scientific men who desire to study the mammals, birds, reptiles, insects, and other forms of life in their native environment. More than 100 papers, many of them of

great scientific value, have been published by well-known scientific men, including Barbour, Chapman, Fairchild, Gross, Van Tyne, Standley, and many others. Dr. F. M. Chapman's book, "My Tropical Air Castle," dealing with some of his studies there, gives a beautiful picture of what nature in the tropics may mean to a devoted student. Barro Colorado Island promises to become a world-famous center of scientific inspiration and research.

A LAST-MINUTE ADDITION

In the many consecutive seasons that Dr. Chapman has occupied his comfortable little cottage on Barro Colorado Island, I have received from him interesting letters, giving an account of his hermitlike life in that temporary abiding place. By a coincidence, he sent me under date of January 24, 1935, a letter that reached me the very day this manuscript was to be sent to the printers. I take the opportunity of quoting a paragraph in concluding my narrative relating to our most southerly possession.



Photograph by Dr. Frank R. Chapman

AN OCELOT FOLLOWS A TRAIL THROUGH THE JUNGLE

This most beautiful of the medium-sized cats is a nocturnal forest dweller that subsists largely on birds and monkeys. Although a few have been tamed, ocelots are not usually dependable in captivity. This is another one of Doctor Chapman's triumphs on Barro Colorado (see *NATIONAL GEOGRAPHIC MAGAZINE*, September, 1927). It illustrates once more the value of the automatic flashlight in picturing nocturnal animals too elusive to be photographed in the daytime.

"A letter from you always recalls the many good times we have had together. Would that we could repeat them, but you can't have your cake and eat it, too. I am much better though I can't go very far, but you don't have to do that to see things here. Tonight, more than 20 howling monkeys are sleeping in the trees over my house. They have been there since noon and are an unending source of interest. A neighboring Almendro tree has had half-a-dozen coatis in it, and the one that I call Jose greets me daily and has revealed a sur-

prising degree of intelligence. I have made almost 500 feet of motion films of him."

This brief quotation terminates an account of a great accomplishment in Central America—where, by reason of skill and persistence, the western hemisphere has been severed into two nearly equal parts by the building and maintenance of a continuous waterway between the two oceans. By the creation of Gatun Lake, it is now possible to circumnavigate the northern continent without putting a foot on shore.



CHAPTER XII

In the Yellowstone National Park Region

IN 1904, while a member of the Committee on Public Lands of the Fifty-eighth Congress, I went West to look into the advisability of recommending that Congress extend Yellowstone Park to include possibly Jackson Lake and the Teton Mountains in northern Wyoming, these areas then being parts of a national forest. Inclusion of the Tetons would not only add a region of singular beauty and grandeur to the park area, but enlarge both the summer and the winter ranges for the increasing bands of big-game animals.

When I entered the park at Gardiner, I called on my old friend, the military superintendent, Colonel (afterward General) S. B. M. Young, who was quartered near the Mammoth Hot Springs Hotel. He was favorably disposed toward the proposed southern extension of the park, and many others interested in the park's development took a similar attitude.

On my return to Washington, Congressman Mondell, of Wyoming, who was also a member of the Public Lands Committee, vigorously objected to my project on the grounds that most of Yellowstone Park had been created out of public lands in Wyoming when it was a territory, and that after it became a State considerable parts of it had been set aside as national forests. His constituents had become rebellious at the idea of any further encroachments on the State lands.

STATE GAME REFUGE ESTABLISHED

The affair resulted in a compromise by which the Wyoming Representative agreed to recommend that the State Legislature should establish a State game refuge on the national forest just south of the park, in which the game would have the same protection as was contemplated in the proposed legislation by Congress. The year following this agreement the Wyoming Legislature created a large game reservation which covered much of the area in question. Thus was consummated my plan to give needed protection to big-game animals south of the park boundary.

Meanwhile I had become interested in the reports that a few moose could be found throughout the year in the Upper Yellow-

stone Valley and about Bridger Lake in northern Wyoming. They were said to have lived long there in seclusion at an elevation of some 8,000 feet. Seton had recorded seeing moose in the park in 1897. Colonel Young told me that some of his rangers had reported seeing several at the southwestern end of the park, and he hoped I would return the following year to learn something more about an animal that had generally been regarded as extinct in the Rocky Mountains south of Canada. The project appealed to me and I determined to return when a propitious time arrived.

THE GRAND TETON NATIONAL PARK

In 1928 Congress established the Grand Teton National Park, thus carrying out a part of the recommendations I made after visiting that region in 1904. In 1929 President Hoover appointed a commission to examine the area lying south of the southeastern part of Yellowstone National Park and known as the Thoroughfare Country, including Bridger Lake, to determine the desirability of adding it to the park. The committee visited the area in the summer of 1929 and unanimously recommended that it be taken into the park.

A bill to accomplish this result was introduced in Congress but was not acted upon. Public sentiment, however, is so favorable generally to the project that little doubt exists that the extension will be made. With this accomplishment the recommendations I made after a personal examination of all that region will have been carried out after a lapse of more than 25 years.

These additions to the national park system will be of the greatest value not only in preserving some of the finest scenery of that region, but also in helping to perpetuate the Rocky Mountain moose, the elk, and other large and small game.

After concluding in the autumn of 1904 the inquiry regarding the park extension, I set out with my guide, John Hammer, for a 10 days' shooting and photographing trip to Henry Lake in northeastern Idaho, intending to fill in the odd hours with the excellent trout fishing. On the way down the Madison River from Yellowstone Park we stopped at a tourist camp for lunch.



A MOUNTAIN WOODCHUCK WAS MET

This stockily built little animal, common in the Yellowstone region, looms up in the photograph almost like a small bear.

I saw two brown bears, one very large, leaving the woods and coming toward us.

A camp attendant said that these animals came daily for their lunch, and were particularly fond of crackers covered with jam. They appeared to be very friendly, and before leaving I asked John to pose for a picture with a big bear standing erect and eating from his hand.

He demurred at this, saying that he "didn't want to make any nearer acquaintance with such brutes."

POSING WITH A BIG BEAR

I promptly offered to be a substitute. With John handling the camera I held aloft a choice morsel, and the larger bear stood up on its hind legs beside me. At that moment the sun was covered by a passing cloud, and I asked John to wait for better light. As he replied, "All right," the bear dropped to its front feet and made for him with a rush. He quickly picked up an imaginary stone and made a threatening gesture; whereupon the bear growled and departed for the woods. When I asked the substitute photographer how he had the presence of mind to make such a demon-

stration, he replied that he had been watching these animals for an hour, and had noticed that whenever one of them came too close to the kitchen tent the cook would chase it away by threatening to throw something at it.

The only explanation of the bear's rush seemed to be that he regarded John's answer to me as an order not to give it anything. This is a question for an animal psychologist to decide. Had John started to run, he would probably have been pulled down and given a cuff or two or something worse.

JOHN WAS SUSPICIOUS OF BEARS

Two weeks later we read in the press of two brown bears that had broken into a hotel cache in Yellowstone Park and badly injured the caretaker when he tried to drive them away. John's comment was, "So you see that your two brownies were not such nice companions after all."

Such occurrences are extremely rare in any of the national parks; for whenever one of the bears loses its fear of man and threatens serious injury to property or visitors, it is promptly killed by park rangers.

A drive of 18 miles brought us within sight of Henry Lake, nestling in an amphitheater among the hills at an altitude of 6,500 feet. Among the early pioneers located there were Vic Smith and Dick Rock, noted big-game hunters and guides. About 1888 my uncle, Major Kennedy, while on a hunting trip, had made his headquarters with Dick Rock. He was so impressed with the solitude, the beautiful scenery, the exhilarating climate, and the great variety of game, that in 1890 he organized a small club composed of friends from the East. Among these were Col. W. R. Howe, Col. John Pitcher, Emerson Hough, Doctor Penrose, my classmate Carter Harrison, and my brother.

Soon after the clubhouse was built, Dick Rock met a tragic death by being impaled on the horns of one of the supposedly tame buffaloes in the corral near his cabin. This affords another link in the chain of evidence that male deer, elks, or buffaloes, if kept long enough in confinement to lose their fear of man, are much more dangerous than the carnivorous beasts such as the wolf, bear, or puma at large in the wilderness.

Henry Lake, three miles long and more than two miles wide, is shallow and fringed with marshes. It is much frequented by



THE BEAUTIFUL TERRACE AT MAMMOTH HOT SPRINGS WAS THE FIRST PHENOMENON PHOTOGRAPHED

After leaving Gardiner, at the northern entrance to Yellowstone Park, the author and his companions soon reached the Mammoth Hot Springs Hotel, opposite which was the residence of the military superintendent.

wild fowl, and contains an abundance of brown mountain trout. In its inlet streams are speckled trout. In the south fork of the Madison River, a short distance away, grayling afforded me excellent sport, but in recent years this species has become much reduced by excessive fishing. The ducks breeding at the lake were canvasbacks, mallards, blue-winged teals, and lesser scaups.

At the time of our visit several pairs of trumpeter swans rearing their young on the lake were rigidly protected in an endeavor to help restore this stately bird in its former western range. Sometimes an early freeze in the beginning of September, and before

the opening of the shooting season, would compel the locally reared birds to take wing for the South, but soon the waters would open again and ducks from lower altitudes to the northward would continue to come until well into November.

GROUSE AND SAGE HENS ABUNDANT

On the foothills about the lake were grouse of several species, including the blue, sharp-tailed, and ruffed, and on the plains a short distance to the south were great numbers of sage hens. The upland birds afforded a pleasing diversion in shooting and a chance to stretch one's legs after a day or



A COYOTE PAUSED ON AN IDAHO HILLSIDE

This industrious rover was so intent on his hunt for small game in the low vegetation that he was unaware of the author's presence until the click of the camera drew his attention.

two in the duck blind, and besides made a welcome addition to the table.

After hunting a few days with the gun, I tried the camera for photographing waterfowl in flight, for I had just begun to take an interest in this method of wing shooting (see page 299). The most successful of these efforts were pictures of avocets on the wing with the mountains in the background.

One night John and I skirted the shore in search of muskrats and found them plentiful, for their pelts had not then advanced sufficiently in value to interest the western trapper. Whenever the flashlight was fired, these little animals plunged squeaking into the water, believing perhaps that the guns that boomed in the daytime had now been turned on them. When we took these night trips, the bushes at the edge of the water were sparkling with frost; for at this elevation there is a great contrast between the temperatures of day and night.

With the completion of the railroad to the western entrance to the park, many of the larger game animals about Henry Lake moved into safer regions. The overflow of elk and deer each fall from the park, how-

ever, still continues to afford the settler or visiting sportsman excellent shooting.

This is a good example of what these great game reservoirs may mean. When only the surplus stags are killed, the main herd remains intact. It can be sustained indefinitely except when severe winters or other harmful conditions cause such a loss, that the surrounding States must modify their open seasons in order to maintain a proper breeding stock.

JAKE BROWN'S FOXGLOVES STILL GREW AT HENRY LAKE

In front of the clubhouse I noticed a thrifty row of foxgloves raised from seed brought there 10 years before by my old guide, Jake Brown. These were a sad reminder of what we, at that time, considered his desperate and ill-fated trip overland toward Alaska. Before leaving for the East, I collected some of the ripening seeds, and later planted them about the Michigan camp, from which their ancestors had made a trip to the Rockies nearly a decade before.

The information gathered concerning the moose in the Upper Yellowstone and Bridger Lake country during my brief trip



MOUNTAIN MUSKRATS WERE WILLING NIGHT SITTERS

The author hesitated about taking flashlight pictures here and risking alarming the wild ducks on the lake, but the muskrats were too bold and inviting to resist.

to that region in 1904 lingered with me. It always seemed to carry an element of mystery. Many inquiries about these animals and the character of their antlers elicited little information from naturalists and sportsmen in Washington and elsewhere.

The only specimen from the region that I found was a fine mounted head belonging to Carl Rungius. It now is a part of the collection of heads at the New York Zoological Park. Probably other heads from the same region existed in private possession or in museums, but most of them no doubt had passed beyond the possibility of positive identification.

Scientific institutions, such as the National Museum, had few specimens and no data bearing on the detailed distribution or on the number existing in the Rocky Mountains south of Canada. Information came to me that in 1906 moose had been seen about Bridger Lake, Wyoming, a few miles south of the southeastern corner of Yellowstone National Park, and I determined to try to learn the facts about them.

An examination of the map indicated several possible routes to the district in question—one by the way of eastern Wyoming

and Thoroughfare Creek; another from Jackson Hole through Two Ocean Pass; and a third by way of the park and up the Upper Yellowstone River by pack train or possibly by canoe. The last-named route I selected as being the most feasible for carrying the heavy outfit I needed.

Wishing to avoid dependence upon a pack train in the mountains, and believing from information received that the Upper Yellowstone was navigable for a light boat early in the summer, I took with me a large collapsible canvas canoe capable of carrying three persons and more than a thousand pounds of outfit.

A REVOLVER IN THE PACK

At that time Yellowstone National Park was under military supervision, with headquarters at the Mammoth Hot Springs. Upon our arrival there late in July, 1908, our party was registered for Wyoming via the park. It then developed that somewhere in my outfit there was a little 32-caliber revolver. To the request that it be produced and sealed I demurred, simply because I had no idea where it was and to search for it might mean the removal of

everything from the wagon. A few minutes later I looked up Colonel Young, the superintendent, and after making the proper stipulations, he directed that the outfit be passed just as it was. What later effect the carrying of this unsealed revolver had must be judged by the readers.

The second morning out, as our team was laboriously traveling up a long hill between the Grand Canyon and Yellowstone Lake, we met two persons on horseback approaching at a rapid gait. As they were passing I recognized them as Nicholas Longworth, a colleague in the 58th Congress, and his wife, the former Alice Roosevelt. I touched my hat and shouted a greeting. Very soon afterward I heard behind me the sound of approaching hoofs, and turning saw Longworth returning.

SPEAKER LONGWORTH GUESSES RIGHT

We checked our team, and he rode alongside while we had a friendly visit. Before he left us, he said he had guessed who had given the greeting and had come back to verify his guess.

That afternoon we arrived at the lake, where we received a hearty greeting from Billy Hofer, the well-known guide. He was opening a package of Roman candles to be used in firing at the bears, whose ever-increasing depredations made the running of an outfitting store an unprofitable undertaking.

That night I slept in one corner of a canvas-covered storehouse. Noticing a large ragged hole in the wall, I told Hofer that there seemed to be no trouble about ventilation.

He replied, "I think not, and you may have more air before morning, because that hole was made by a black bear night before last, when he butted in and went off with one of my biggest hams."

My Michigan guide thought we ought to sleep on an upper shelf, but John never did have much use for bears on the hoof.

In the morning I arranged with Billy Hofer, who was the controlling spirit in a boat company recently granted privileges for public transportation on the lake, to use one of his larger launches to convey me to the southeast corner of this beautiful body of water. Thence I planned to ascend the Upper Yellowstone to Bridger Lake in Wyoming.

Before leaving for the West I had made inquiry through the appropriate department

in Washington for information regarding the navigable character of the Upper Yellowstone and had received assurances there, as well as from the authorities at the park headquarters, that the upper river was without falls or rapids and carried sufficient water for a heavily laden canoe. Whether the current was swift or not, no one seemed to know, for so far as had been reported, no boat or canoe had ever ascended it.

Besides my Lake Superior guide, I took with me George Farrell, of Gardiner, who for 25 years had been a hunter, guide, and park attaché. He was believed to have more knowledge of the country north of the Tetons than any one else then available.

On July 23 we left the north end of Yellowstone Lake with Mr. Sargent, one of Hofer's right-hand men, at the wheel. When we were midway in the lake, a heavy southwester came up and thoroughly tested the seaworthy character of the launch. Just before the storm broke I had a momentary sight of the Tetons in the southwest, and recalled that four years previously I had obtained a view of these pinnacles from the opposite side at Henry Lake in northeastern Idaho.

To keep out of the trough of the sea, we were compelled to bear several points west of our destination, and after reaching the lee of the shore, we turned and ran into the southeast bay near the delta of the Upper Yellowstone. There we planned to camp for a couple of days before attempting to ascend the river.

VAST PELICAN FLOCKS LOOK LIKE SNOW FIELDS

As we entered this bay, I noticed the two small reeflike Molly Islands were covered with what looked like windrows of snow. The glass disclosed these patches to be hundreds of great white pelicans standing erect in solid columns or scattered here and there on their nests. The island lying nearer to us was almost wholly occupied by a colony of gulls and terns. We hurried by, intent on making camp before dark, hoping at a later opportunity to examine these birds at closer range.

As we tossed our equipment ashore, I was surprised to hear Sargent say that so far as he knew we were the first in 14 years to come by boat into this end of the lake, and that the only times this part of the lake came under the eyes of man was when park scouts or hunting parties bound for



AVOCETS FLY OVER HENRY LAKE, IDAHO

Jackson's Hole were traveling along the trail that skirts the eastern shore of the lake and follows the hills bounding the eastern valley of the river to Two Ocean Pass.

On the following days I discovered that his description of a perfect wilderness was true. In our explorations along shore, into the various lagoons, and up the smaller streams, we found no trace of a camp or other evidences of man except a few signs of Government survey camps occupied many years before.

THE BULL ELK KEPT ALOOF

The first night we camped by a bay on a small promontory facing the broad delta of the Yellowstone. The canvas boat was set up and strengthened by hardwood strips cut for the purpose. As the sun descended and the wind fell, hundreds of elks, cows, and calves sauntered down from the lower hills to feed on the swamp grass of the valley; but not an adult bull was seen then or later on the trip. During the midsummer period of antler growth they remain secluded among the highest timber.

The wild fowl had nearly completed their nesting, and many species were beginning to gather along the sand bars, mud flats, and grassy islands, which largely occupy

the shore line of that part of the bay lying between the great ridges forming the barriers of Yellowstone River. I saw fully a hundred families of wild geese, the young of which were then in the stage known as flappers. It would have been no trick at all to have tender goslings on our bill of fare had we wished to violate the rules of the park and the ethics of sportsmanship.

We made several pleasant trips to the pelican and gull islands to obtain photographs of the breeding colonies. Although these birds had long been familiar to those who follow the great driveway along the Lower Yellowstone at the north end of the lake, I had been unable to find anyone who knew where they bred. It was assumed that they occupied an island somewhere in the southerly end of Yellowstone Lake.

Yellowstone Lake is one of the largest bodies of fresh water for its altitude (7,741 feet) in the world; and while its northwestern shore is traversed each summer by probably more tourists than any other mountain lake, it is less frequented at the upper end than any of the others.

Such a condition is due to the park's having been established so long ago, and to the scarcity of big-game hunters coming over the mountains to the southern boundary.



THERE ARE ATTRACTIVE BIRDS ABOUT WESTERN LAKES AND MARSHES

About the lakes of Idaho and Utah, avocets are numerous. Their long necks and legs, contrasting black and white plumage, and shrill cries attract attention.



DELTA OF THE UPPER YELLOWSTONE RIVER

To the right is a bit of shore line of Yellowstone Lake, and in the middle are some ponds in which several small black objects indicate feeding moose.



A GOLDEN-MANTLED MARMOT FEELS AT HOME IN A LOG PILE

This western woodchuck, which abounds everywhere along mountain trails, is similar in general appearance and habits to the familiar animal of the Eastern States.

The same game can be found lower down, and the State of Wyoming has made the adjoining national forests into a State game refuge. With no hunters passing either way through the valley, this area has lapsed into an almost untrodden wilderness.

Occasionally a Government scout follows a blazed pony trail on the eastern foothills of the valley, but such persons remain mostly out of sight of the timbered bottom lands teeming with unseen and uncounted game. Since there are here none of the more spectacular manifestations of nature, so abundant elsewhere in the park, inducement has been lacking to divert into this distant corner the great flood of tourists that annually sweep along a circular journey in and out of the park.

THE MOUTH OF THE YELLOWSTONE

On the morning of July 26 we loaded our canvas canoe for the start, but lost some time trying to find the real mouth of the Yellowstone River, which lies well under the eastern chain of mountains and has several side channels and deep bays. Two other small streams that enter the bay near it added to our difficulty. While we were

paddling about, we saw thousands of geese and ducks, mostly females with their broods, and all as wild and unapproachable as if they were in a less secure retreat.

Migrating wild fowl shot at during eight or nine months of each year do not lose their dread of man in the short nesting period unless they are brought into continuous contact with those who do not kill, as is the case in the many ponds alongside the park highways, where the birds sit preening themselves as the heavily laden coaches rattle by. The same is true of game animals, for those about the tourist hotels are frequently tamer than domestic stock, whereas those in the more secluded parts of the park are the wildest of the wild.

After entering the river, we soon found the current much swifter than we had expected. Looked at casually from a distant trail on the mountain side, the river appears to be a sluggish stream, but in the entire trip we found not one foot of slack water, although by those voyaging in a trim cedar canoe the stream would by no means be considered a swift one.

We used a pair of very light pine oars and two paddles, rather frail because of

their being jointed with brass ferrules. One could not apply more than half strength to the work. By 11 o'clock we had gone several miles up the river, at an estimated speed of about a mile and a half an hour, and since Bridger Lake was about 35 miles distant the outlook was rather discouraging.

By an oversight I had neglected to bring my long tracking line, which I had so often (page 417) used in the swift waters of Canada, Newfoundland, and elsewhere. Our short line, about 20 feet long, however, helped us work around dangerous log jams.

Since neither of my two guides had ever handled a long pole while standing erect in a canoe, I knew it was useless with the poor material available to attempt to pole the heavily laden canoe up the river. Although I had had some experience in handling a pole, I hardly felt like undertaking the task in this case. A large and cumbrous canvas canoe, laden as this one was, makes difficult work for even the strongest and most experienced canoe man.

CHARGED BY A SILVER-TIP GRIZZLY

While I was taking advantage of the opportunity when we were stranded on a sand bar to look at a favorite crossing place for elk, I suddenly saw a large animal leap out of the bushes at the head of the bar and come down toward us. It proved to be an immense silver-tip grizzly. Since he was fully 100 yards away, none of us thought other than that he was badly frightened, probably by our scent circling in behind him. This belief was but momentary, for with his head up and eyes on us, he obviously intended visiting the stranded boat.

Aside from my exclamation, "Look ahead," we were silent and motionless. When the bear was 40 yards away, I managed to get hold of the small revolver in a bag at my feet, and in desperation fired two shots over his head; but on he came, probably not having heard the slight crack of the smokeless powder. I fired the third shot at his exposed chest when he was only a dozen yards away, and saw by a swirl of the heavy hair to the right that the misdirected bullet had creased his side.

At the same instant the Montana guide, Farrell, gave one of his mountain war whoops and brandished an oar as threateningly as possible. The bear stopped, swung his head from side to side, with his small eyes fixed for the first time intently on the boat, and then with a quick whirl, which

sent the loose gravel in every direction, he put for the bank and into the heavy bushes at a gait that did our hearts good.

Although relieved by the sudden change in the situation, we lost no time in shoving out into the deeper water and were soon on the way again. Undoubtedly, there are many, either in good faith or under the stress of temptation to magnify the perils of the wilderness, who would attribute to this bear a deliberate attempt to kill us, and say that he was deterred only by the apparently courageous reception he met.

Such, in my opinion, was not the case at all. Both sides were equally frightened and both labored under a misapprehension.

The animal had been waiting to catch calf elk when they were swimming the swift waters at the crossing. From his ambush on the bank he had heard a commotion down the river, and, hampered by the notoriously poor eyesight of all bears, he had mistaken our brown canvas coats and the splashing paddles for the game he sought.

Had he meant to harm us, the sting of the pistol bullet, and the accompanying demonstration would have had no effect beyond aggravating his rage. That he had run into an unexpected gathering, and that it was purely "a case of mistaken identity," his hasty retreat sufficiently proved. The day has gone when any bear in any part of the United States will wantonly attack a man when it is unmolested.

At the next bend, however, as a matter of precaution, we took the axes out from under the outfit and cut a heavy pole for use in "a crack on the nose," which, according to Farrell, an old-time bear hunter, is worth a dozen random rifle shots.

THE AUTHOR ON THE TOW LINE

We continued to struggle against the swift current, but our progress was slow. It seemed now that the only way that we could make more speed was for me to get out of the canoe and thus lighten the bow to a material degree, and with the 20-foot rope occasionally pull the boat against the swift water at some of the bends. Since the rest of the crew had their axes and the club, I, of course, took the revolver ashore with me, Farrell remarking, I thought with a little sarcasm, "You might have occasion to use it in another case of 'mistaken identity.'"

At one place, while walking in thick brush a hundred yards ahead of the canoe, I heard a heavy animal crashing toward me



IT BELONGS TO THE TIN-CAN BRIGADE

Grizzly, brown, and black bears daily sort over the garbage piles back of the park hotels, where thousands of pictures are taken of them. When these animals are en route along wooded trails to the garbage field, they are not infrequently described as "wild bears in their natural habitat." Such statements are very misleading.

through the bushes on my immediate left. My theory of a few minutes before somehow vanished, and, jumping to the edge of the bank, I drew the revolver and faced the approaching animal. I intended in case it was a grizzly to fire a couple of bullets into him and then take the revolver between my teeth, jump into the swift current, and swim down to the canoe below me.

As I stood with the revolver pointed at the quivering bushes, out came the head of a large cow elk, which appeared as ill pleased as I was gratified at the encounter. She turned and rushed along the bank, jumped into the stream, and swam across, much to the amusement of my two guides, who had been watching the pantomime from below.

Almost at once I saw some moose tracks, and as I continued on hardly a mud flat was without them. At the time this came as a surprise, for, according to the park authorities, there were not supposed to be more than a dozen moose in the entire park. An opening in a wood near by suggested a pond, with water probably warm

enough for aquatic vegetation. I approached cautiously and found just such a place, with a big, black-colored bull moose in the midst of a feast.

Heretofore I had made a rule not to photograph animals in public parks or game reservations of any kind, because the lack of skill needed to take these half-tame creatures makes such a pastime as unattractive with the camera as with the gun, and because many of these animals have lost their wild characteristics.

NO PARK "WILD ANIMAL" PICTURES

This wary and uncontaminated creature suggested, of course, an exception; but since it is always difficult to draw the line, I decided that the park line should still be the one to go by. After noting the color and size of the animal and the shape of the antlers, I returned to the river, hoping that after we crossed the boundary we might have another chance at an animal supposedly rare in the mountain States.

The next afternoon I walked within 50 feet of a large bull moose that, lying half



A BROWN BEAR EYES HOFER'S STORE AT THE LAKE

Roman candles were used to deter these marauders during their night raids (see text, page 298).

asleep at the lower end of a small island, did not rise until the canoe came in sight. Then another bull got up farther back, and as they ran off they were joined by a cow—one of the few instances in which I have seen the female consorting with bulls in midsummer.

Before reaching the lake on the return trip several days later, I saw six more bulls and another cow. This made a total of 11 seen along the swift, cold waters of the Yellowstone. Doubtless a visit to some of the small ponds and lakes in the valley, where summer food abounded, would have shown many more. This area was not more than eight miles in extent in a direct line, although because of its circuitous course it was probably 16 miles by the river.

BOTH OARS BROKEN

On the third day our ascent of the river was definitely ended when both oars broke. Although mended and wound with copper wire, they became useless in combating the heavy currents we had to conquer at every turn of the river. At this season the warm weather was melting the last of the snow drifts on the higher summits, and although the high water was favorable for reaching

Bridger Lake, the current proved too strong to be surmounted by our outfit. In my visits of succeeding years, all of which occurred later in the season, low water became an equal impediment.

The comparative abundance of moose in this isolated valley was now no longer a matter of speculation. If I was able to return the following year, it would be for the purpose of estimating their numbers and of studying their peculiarities.

When on our return we passed the sand bar where the bear had greeted us silence was the order of the day, and we glided by with all the armament within easy reach. At the next bend the canoe nearly ran into a band of 50 elks, lying drowsily in the sun on a small, sandy island, with two or three old cows standing guard. Evidently the big silver-tip had left the neighborhood.

The night of August 4 we made camp under a high mountain at the southeast corner of the lake. I had previously arranged that the canoe should go down the shore a distance of 10 or 12 miles to Signal Point, where a big fire was to be built after dark at an elevation sufficiently high to be seen 20 miles diagonally across the lake. On the following afternoon the launch was



THERE IS A BREEDING PLACE FOR WHITE PELICANS ON YELLOWSTONE LAKE

Molly Island is marked by the white line of birds on it. The high, forested mountains in the background make an impressive setting for their nursery.



WHITE PELICANS ON YELLOWSTONE LAKE TAKE REFUGE FROM INVADERS OF THEIR BREEDING PLACE

In 1920 and 1927 the author saw hundreds of these birds wintering along the Gulf coast. In 1928 and subsequent springs a colony of them has been found nesting on a small island off the Texas coast, far to the southward of their usual breeding grounds.

to come for us, for it was not considered safe to cross this deep, wind-raked lake in a canvas canoe.

Now occurred the second episode in bear antics, which is best detailed from the camp notebook.

"Last night we had a surprise. I was awakened at 9 o'clock by loud yells from the guides' tent, followed by cries of 'Bear! bear! bear!' Seizing the little revolver and hurrying out of the tent, I looked about in the moonlight, but saw nothing. Approaching the guides' tent, I asked what was wrong. Hammer, who had not yet succeeded in crawling out of his sleeping bag, replied that a big bear had just seized the sack containing all our salt meat and canned goods and had made off with it. An investigation showed this to be true.

"Farrell, perhaps irritated at the idea of going on short rations for two days, declared that my habit of placing bait close to the camp to coax coyotes and other prowlers of the night was responsible for the bear's intrusion. Although, of course, the robber was a black bear, Farrell was of the opinion that it had not developed its thieving habits about any of the tourist hotels. We were more than 30 miles from the nearest one by any land route. He was certain it was not a grizzly, since he had never known one to enter an occupied tent.

A BEAR CHEWED A TIN CAN OF JAM

"The next morning, about 75 yards away from the camp, we found the empty bag, as well as a can that had contained raspberry jam. The contents of the latter had been extracted through perforations made by the animal's large teeth and, though pressed nearly flat, the can was otherwise unbroken.

"On thinking the matter over, I now felt entitled to make one exception to the rule of not photographing animals in the park, and thought that I ought to remain that night for the purpose of taking the bear's picture by flashlight. It was quite certain that the marauder would return in search of another feast.

"The guides, viewing the matter as fun lovers and not as photographers, thought it would be a good joke on the bear. We therefore agreed that the two guides should take one tent and paddle down the shore to Lookout Point, where the signal fire would be built. On the following morning they could return for me in plenty of time to be picked up by the launch.

"After the men had passed out of sight, I began preparations for the coming bombardment. The little table, made of driftwood, in front of the guides' tent, had been left standing, and on this I placed two cameras facing down the elk trail. To a stake 30 feet away I hung some trout, with a string running to the flashlight apparatus. Impatiently I awaited the coming of twilight, sitting for a time on the edge of a hill and watching some moose feeding in ponds a few hundred yards from the river.

PREPARING FOR THE FLASHLIGHT BATTLE

"As the day declined, the light of the nearly full moon became so brilliant that I could see plainly 75 yards down the trail. I was surprised, as time passed, that there had been no signs of the bear, and at half-past 9 decided to lie down in the sleeping bag. I had not been there more than five minutes when a metallic click indicated that a bear or some other animal had pulled the string of the flashlight machine and that it had missed fire. Hastily looking out of the tent, I saw a large, dark animal leisurely devouring the fish, and knew it had already thrown open the shutters of the cameras; but, in the absence of an illuminating flash, the effort was a failure.

"For a minute this was disconcerting, until I recollected that I had a hand-flashlight apparatus, loaded for any emergency, and that by crawling to the cameras I could fire this and get precisely the result that would have been obtained had the other one gone off.

"This plan I attempted to put into execution, but just as my finger was pressing the trigger there came a deep 'waugh' and then the sound of a heavy animal running away. Looking over the cameras, I saw the bear galloping down the elk trail and disappearing around a bend.

"Examining the apparatus, I found that the safety catch had not been withdrawn, and that the firing pin, in striking an intervening piece of steel, had made the click mentioned.

"For several minutes I worked away resetting the shutters and adjusting the string, when I became aware of heavy breathing close by, and in some trepidation looked about, but could see nothing. I raised myself slightly, so that I could see over the stand, and there within five feet of me, standing on its hind feet, was a huge silver-tip grizzly. The bright rays of the

moon fell directly upon its head and breast. The little, beady eyes stared at me steadily, the half-open mouth showing a fine set of teeth. This was Farrell's 'black' bear, and my guides were sitting by a glowing fire a dozen miles away!

"To run to the tent to get my revolver and ax seemed a dangerous proceeding, for visible evidence of fear might invite attack from any dangerous animal, wild or domestic.

"An instant later I realized that safety was at hand, for, reaching out, I cautiously picked up the hand flashlight. By shoving this close toward the bear's face and firing it, closing my eyes at the same time, I should blind the animal for several minutes, and in the interim I could reach the tent, even were he disposed to be ill-tempered after such a greeting.

A HISS DIVERTED A BIG GRIZZLY

"Realizing this, I looked at the bear with more composure, trying to figure out the best way of making him depart without alarming him too much. Finally I gave a low, steady hiss. He came down on all fours and, descending the bank, passed through some thick bushes. I heard him walking along the gravelly beach.

"By this time I had made up my mind to give the silver-tip a surprise the next time he came. Removing all the flashlight powder from the hand flash, I added this and some I had in a box to the original load. I placed on top of the powder a large flat stone to increase the speed of the flash and to awaken me by the noise were I asleep, as well as to let the bear know that something was happening.

"Hurrying back to the tent, I reloaded the hand flash, and put the ax and pistol within easy reach. An hour passed. It was 11:30, but no bear appeared. Worn out with continual watching, I once more thought it best to get into the sleeping bag.

"Warned by some presentiment after I had taken off my clothes, I went once more to the front of the tent, and stuck my head out through the narrow opening. I had just got my right eye around far enough to see the cameras when a large shadow appeared to flit across the camera stand, as if the flight of an owl had cut off the direct light of the moon.

"Before this impression had more than suggested itself, there came from the table a dazzling burst of light such as I had never

seen equaled by any bolt of lightning. It shot high into the air and extended on both sides for many feet. Several whirling missiles cut through the pine branches above the tent, and a roar like that of a cannon added to the excitement. An instant later the flat stone came down, striking the edge of the tent.

"My right eye was, for the time, useless; but twisting my head around, I saw with my left eye a large gray object roll down the bank from the camera stand and land in the bushes, where there was a great thrashing about for a moment, and then up the bank came the big silver-tip, headed almost directly for the cameras, and missing them by only a foot or two.

"A yard farther on the bear struck a tall poplar tree with his left shoulder, and the slender tree came to the ground with a crack and a crash. It had been broken off at the base without being uprooted. The animal, tripped and thrown to one side by the collision, rolled over on his back and for a second lay there motionless, with four big feet sticking rigidly up into the air. Then he scrambled up again, and I saw that he was headed in the opposite direction from that in which he had been going. He had turned a complete somersault—something of a feat for an 800-pound animal.

"The bear had now lost all sense of direction, and with another rush he passed the cameras and shot out over the bank, catching with his feet a large boulder. Bear and rock together went in a heap to the bottom.

THE BEAR TORE UP THE SCENERY

"By this time I was beginning to chuckle. The next move the bear made was a plunge through the fringe of bushes between the elk trail and the lake shore, and 75 yards away I saw him cross into a small gulley. By the rolling of the loose stones and shale I could trace his going up this gulley and, later, his ascent of the mountain slope. Finally all was still.

"Examining the seat of war, I found that the huge flash, placed entirely too near the cameras, had burned most of the leather off the boxes, and little was left of the flashlight machine except the bedplate. The leaves on the overhanging poplars were burned or whitened for a distance of 30 feet. Altogether the place presented a scene of devastation.

"Looking the ground over in front of the cameras, I saw where the bear had made



THE FLASH FAILED PHOTOGRAPHICALLY, BUT PROVED A GOOD BURGLAR ALARM

The nearest tree on the right was knocked down by this silver-tip grizzly when the animal was blinded by the flash (see text, page 308).

the first whirl as the flash exploded, when he was not more than two feet away. While I was gazing from the tent, the bear evidently had been standing erect, possibly wondering whether the bright barrels of the lenses contained raspberry jam like the can he had bitten the night before. As he dropped upon all fours his body had struck the string running from the flashlight to the bait. When the explosion occurred, his head and shoulders must have been within the radius of the flame and fumes.

"Is it, therefore, any wonder that he was surprised at the demonstration? Possibly in his cubhood days he had become aware of the danger of putting his feet in boiling geyser springs, and possibly he had had some sad experiences sniffing into vent holes filled with sulphurous steam. He had never dreamed of anything like this.

"Toward noon I saw the canoe approaching with my two men in it. No sooner had they got within greeting distance than they made inquiries about the bear. As Farrell stepped ashore he asked me if 'Old Blackie' had returned.

"Not answering the question directly, I pointed to the fallen poplar and asked him

whether he had cut down that tree. Replying that that was not the kind of a tree he used for firewood, he walked up to look at it.

"Suddenly bending over the trunk of the tree, he seized a bunch of hair and exclaimed, 'My God! It was a grizzly.'

"I cheerfully assented, and then proceeded to tell the adventures of the night.

"After I had finished, Farrell said: 'I am mighty glad you stayed over, now that you are uninjured, and for one reason. That old devil got just what was coming to him, and even if we do not have much to eat for the next two days, I will never fast with better grace.'

THE GRIZZLY LEARNED A LESSON

A week later the negative was carefully developed, although I felt certain that it would be a failure because of the close proximity of the bear and the heavy charge. The reproduction of this photograph appears on this page. Although the flash failed photographically, it was a success as a burglar alarm. No one need have fear of camps being invaded again by the singing grizzly of the Upper Yellowstone.



NAVIGATION PRESENTS DIFFICULTIES ON THE UPPER YELLOWSTONE RIVER

While high water made the trip difficult in July, 1908, low water in September, 1909 and 1910, was worse. The canvas canoe had to be pulled up hundreds of such shallows. The author can find no record of a boat's getting up to Bridger Lake, though, doubtless, Indians and trappers got there before 1870.

The great snowy-white pelicans, with broad jet-black wing tips, are among the beautiful and interesting sights about Yellowstone Lake and the neighboring waters. It was our good fortune to find these birds during the last of July on their breeding place upon Molly Island at the southern end of Yellowstone Lake. Most of the young birds were hatched and partly grown at the time we saw them.

THE WHITE PELICAN AND THE YELLOWSTONE TROUT

These youngsters had a curious habit of gathering into a sheeplike flock when their home was invaded. The old birds presented a magnificent spectacle as they flew away on heavily flapping wings, and were even more impressive as they soared about on outstretched pinions, their gleaming white bodies and black-tipped wings sharply marked against the brilliant blue of the cloudless sky.

The pelicans subsist almost wholly upon the cut-throat trout, known scientifically as *Salmo lewisi*. This is abundant in Yel-

lowstone Lake, where since time immemorial it has been the only fish. Unfortunately, most of the trout are infested with a species of tapeworm, both in the flesh and in the viscera, but those from Pelican Creek are reported to be free from this parasite. Most of the trout in the lake are healthy looking and active, and afford much sport for transient fishermen, many of whom make a catch on the afternoon of their arrival at the lake and have them served that night at the hotel in blissful ignorance of their true condition.

When the trout are cooked there is, of course, no danger in eating them, for the heat destroys the parasite, but our party, like most others staying there any length of time, rarely used them, although now and then we would catch one showing no evidence of infection.

Occasionally we noticed that certain fish had become very gaunt and yellow, looking more like pickerel than trout. It seemed to be the impression among the old-timers that the absence of minnows, crustaceans, and other forms of fish food accounted for the



THEY ARE COMMON ABOUT YELLOWSTONE LAKE

The California gull (*Larus californicus*), in considerable numbers, comes from the Pacific coast to make its summer home about the Yellowstone and other high interior lakes. It is a beautiful bird, adding charm to all places it frequents. Many breed on one of the Molly Islands, near the island occupied by the pelican colony.

condition of such trout, and that continual cannibalism accounted for the general distribution of the tapeworm.

Later investigations, however, indicated that white pelicans were hosts of this worm during one stage of its existence, and it was recommended that all these birds should be killed in order to protect the trout. This announcement caused great concern to the visitors and park officials, for the sight of hundreds of these great white birds soaring overhead or swimming about scooping up the fish in their pouches, was one of the great attractions about these waters.

It was found that none of the fish below the falls were infested, and that in the neighboring lakes, both within the park and beyond the boundaries, the fish were healthy, although they were visited almost daily by pelicans from Yellowstone Lake. This evidence put an end to the proposed slaughter.

One quiet, warm night we visited the white pelican colony on Molly Island, north of the long promontory dividing the south end of Yellowstone Lake. We had already taken a series of daylight pictures of these large and handsome birds, in which

the nearly grown young were shown congregated like flocks of small sheep while the older ones soared overhead.

A NIGHT VISIT TO THE WHITE PELICANS

As we approached the island, the swinging jacklight gave a view of many white forms standing erect like military guards. Before we were close enough to take their photographs the old pelicans were on the wing, but their young remained detached in the vicinity of their nests. Because the young remain close to their birthplace when undisturbed, it is easier for the parents to single them out amid large gatherings and feed them.

After taking several flashlights of the young pelicans we paddled over to a smaller island occupied by breeding gulls and terns, but these birds were even more wary than the adult pelicans. We gave up any further efforts to get photographs and returned to camp, quite satisfied with probably being the first to navigate this wilderness lake under the cover of the night and to witness from a darkened boat the shores unfolding before the jacklight.



THIS BREEDING COLONY OF WHITE PELICANS WAS PHOTOGRAPHED IN YELLOWSTONE LAKE

Until the author entered the southeast arm of Yellowstone Lake in 1908, it was not known whether the pelican nested on the lake or not. From 800 to 1,000 adult birds were there each season. On an adjoining island were gulls and terns.



YOUNG WHITE PELICANS STICK TOGETHER WHEN ALARMED

When a white pelican breeding place is invaded by men, the partly grown young have a sheeplike desire to mass as if for mutual protection, although they are exceedingly helpless.



WHITE PELICANS FLY OVER THEIR BREEDING GROUND

Although a close view of these birds on the ground or water gives the impression of a clumsy, ungainly form; yet on the wing, especially when soaring high with all the ease of an albatross, they present a magnificent spectacle. The jet black wing tips contrast strongly with the uniform snowy white of the remainder of their plumage.

CHAPTER XIII

The Wilderness of the Upper Yellowstone

ALTHOUGH I failed to reach the extreme headwaters of Yellowstone River and Bridger Lake in 1908, I saw so much of interest that I returned to Yellowstone Park late in August, 1909, and again in September, 1910.

When I arrived at Mammoth Hot Springs in 1909, I found that Colonel Young had been replaced by Major Benson, who was greatly interested in the wild life of the park. Colonel Young had urged me to photograph the moose within the park if I failed to get satisfactory results outside its limits. Major Benson also suggested this course as a means of presenting to the public tangible evidence of the existence and abundance of these animals in the area.

MOOSE NOT IN RANGE OF TOURISTS

So far as I could ascertain, not one of the 200,000 people who had visited the park in the preceding 15 years had seen a moose within its boundaries. However numerous moose might become in their chosen haunts, they were beyond the range of the tourists' kodaks.

My guide, John Hammer, and Tom Pearson, one of Billy Hofer's most experienced men, accompanied me on this second trip into the moose country.

On August 30, 1909, smoke curled up from our camp fire on the spot where the year before the robber bear had investigated the flashlight camera on the provision box. The new guide examined the quaking aspen that had been laid low by the bear in his flight from the explosion. A tuft of grizzled hair still adhered to the bark. The guide remarked that this animal might claim to have discovered the fifty-eighth variety of canned goods.

It is significant that on this trip we saw no bears in the wilderness, and that we caught a distant glimpse of just one in the wilds the following year. At the same time dozens of brown, black, and grizzly bears were daily visitors to the garbage dumps behind the park hotels. It was estimated that more than 5,000 photographs were taken of them each season by tourists, at distances varying from 5 to 100 feet.

Ordinarily bears are so wary and secre-

tive that photographing them is an exceedingly difficult task, and I could recall only two good pictures actually taken of them in the wilderness. No sportsman photographer could be interested in big game tamer than domestic stock.

Near the Hofer place two big-game photographers, one of whom had tried with little success to photograph bears in the State of Washington, were bombarding bears, big and little, by daylight and flashlight, with every prospect of exposing several hundred plates within a few days. Such a collection, if truthfully labeled, ought to be valuable and interesting to the general public, and even to sportsmen; for it would illustrate the varying personalities of the animals and their psychological response when their ancient enemy, man, declares a truce and feeds them.

However, photographing bears under such conditions is mere picture taking; it is not *hunting* them with the camera. "A photograph of a Wild Grizzly in His Native Habitat in the Rocky Mountains of Wyoming" may be only a picture of a park mollycoddle bear, and the retoucher's pencil may have been invoked to remove the tin cans from the background.

I once saw seven silver-tip grizzlies within a circle of 20 feet, and the limbs of several adjoining trees were fairly breaking under the weight of black and brown bears and their cubs that had sought the treetops with alacrity upon the coming to the feast of their large and more contentious brethren.

A PHOTOGRAPHER'S DILEMMA

After taking a satisfactory series of pictures in a breeding colony of white pelicans on Molly Island, I decided to use my last roll of films to illustrate the harmlessness of the bears at the garbage pile behind a hotel at the other end of Yellowstone Lake. I gave one of the guards some food that would appeal to the bears, and several of them soon gathered around him, standing on their hind legs and reaching for morsels held aloft.

While I was grinding away on the crank of the camera, one large bear ambled toward me, and I slowly retreated, picturing



Photograph by A. M. Lindsay, Jr.

BRIDGER LAKE LIES IN MOOSE COUNTRY

This little body of water, a few miles south of the park boundary, at the time of the author's visit was the objective of his first expedition to verify that moose had been seen here in 1905.

**BEAVERS HAVE BEEN BUSY EVERYWHERE IN UPPER YELLOWSTONE VALLEY**

All the small streams entering the upper river were dammed at short intervals by these animals. The plants growing in the beaver ponds were often visited by the moose.



A WIDELY PALMATED ANTLER PROJECTED FROM A SAND BAR

On removal it showed that some of the mountain moose had broad antlers. The author had doubted that such was the case before he found and examined this specimen (see text, below).

its approach. Alas, I backed into a log, and came down with a thump, my feet in the air. The bear evidently regarded the camera as a lunch box, for he reached over and tried to take it away from me. Had not the guard come to my rescue, he would have succeeded. Another moving-picture camera should have been in use recording my dilemma.

ON THE UPPER YELLOWSTONE

On September 1 our party started up the river in a rowboat and a large canvas canoe. A mile up the stream we left the rowboat for use on our return to the lake in case the canvas canoe should be irreparably damaged by snags in the deeper places or by the sharp rocks in the shallow parts of the upper courses of the stream. From the first our progress was slow, and even with the aid of a long tracking line we never exceeded two miles an hour.

We devoted considerable time, of course, to a careful examination of the surrounding country to locate moose. The first six moose that we saw were all bulls, and each carried the long, narrow antlers of the kind noted the year before. I had now little

doubt that the moose of this region were unique in this particular.

On the third day, however, my hasty judgment was completely reversed. As we were slowly passing a long stretch of beach, I noticed projecting several inches above the sand the broad and well-serrated tip of what must necessarily be a moose antler of unusual size. With some effort we finally drew it out of the packed sand.

The trophy proved to be the right antler of a big bull. It measured nearly 30 inches in length, and had a palmation exceeding 15 inches in breadth. In every respect it resembled a normal antler growth of one of the larger bulls of lower Canada, Maine, or Minnesota. With seven inches allowed for the breadth of the skull between the burrs, this pair of antlers would have measured more than 50 inches in spread.

The injuries to some of the points were not the work of rodents, but plainly fractures that had resulted from contests with other bulls. Since I had never before found well-preserved antlers in a wooded country, where rodents were abundant, I assumed that the intactness of this find was due to its having been buried in the sand.



THE BULL, COW, AND CALF MOOSE WERE PHOTOGRAPHED WHERE NO ONE HAD BELIEVED THEY EXISTED

There are dozens of ponds and beaver dams in the valley of the Yellowstone, where the warm waters are favorable to the aquatic vegetation which the moose devours. About 1,500 moose were probably living in this, the most populous moose country in America, until they began migrating into the Jackson Hole country, Wyoming.

Late the next afternoon, while fishing in the shadow of a heavy cedar, I noticed two big bulls making their way to the water at the opposite bank. The larger of the two bore wide-spreading antlers of some 30 points. Here again the palmation was extremely broad, and particularly noticeable, since the velvet was nearly gone and the newly exposed surface shone like ivory in the afternoon sun.

The smaller bull also had large and well-formed antlers, but still wholly in the velvet. Later in the same evening we saw, just above our camp, a cow and a four-year-old bull, the latter bearing antlers similar to those we had seen a few hours before. I was now certain that the long, narrow antlers borne by the 15 bulls seen before represented only one type of antlers of the Rocky Mountain moose. This conclusion led to the opinion that a further inspection might disclose other types and intermediate forms.

SHALLOW WATER CAUSES DIFFICULTY

On the fourth day, after passing the last camp of the year before, we began to lose hope of reaching Bridger Lake; for now the water at the widest parts of the river channel was shallow in many places and ran swiftly over gravel bars, causing the canvas canoe to drag heavily on the pebbles and broken rocks. Frequent unloading and repairs were necessary.

At sunset we struck a long, swift stretch of water divided into several channels by temporary islands, and here, in our haste to reach a camping place before dark, we put too much power on the tracking line. To our consternation, we saw the canvas canoe shiver from stem to stern, as an upturned piece of shaly rock cut a two-foot slit in the middle of it.

Hastening into the shallow water, we dragged the half-sinking boat ashore. Our second effort to reach the headwaters of this stream by water was ended. We determined to camp for several days on this part of the river and explore on foot the valley to the southward. Since we had plenty of strong thread and needles, extra canvas, and pitch, John was sure that while we were exploring the valley he could put the canoe into condition for our return.

Next morning, in the midst of a heavy thunderstorm, I walked some miles up the valley and I saw several moose and a great many elk. I walked to within a hundred

feet of a large bull moose and a smaller companion. These animals stood looking fixedly at me as I approached them in an open meadow. After I had taken several pictures, the large bull turned and walked off slowly, followed by the younger one. They walked for perhaps a hundred yards and then broke into a run. I ascended a hill near by and traced their course for three miles across the valley without observing any slackening in their speed.

The next afternoon I found this same pair 12 miles to the south. The two animals were so stolid that they could have been shot without any difficulty, and yet when finally alarmed they left for an entirely new range. Such habits distinguish the moose from all our other antlered animals.

Their disposition, however, to keep away from civilization and to live apart from one another except when yarding in the winter, together with the fact that the female moose, unlike the elk and the caribou, usually bears two young at a time, favors the long-continued existence of these strange animals. The immense forest areas that are now covered with second growth because of lumbering or fire provide much better food and shelter for the animals than ever before. With good laws properly enforced, there is no reason why these animals cannot be preserved indefinitely in suitable ranges.

Ascending the higher peaks from time to time, I examined and mapped the river bottom to a point several miles beyond Bridger Lake, which I could see glistening in the deceptive atmosphere of this region, apparently only a few miles away. The trip verified my impressions of the preceding year that the country lying between the south end of the lake and the source of the Yellowstone River was the wildest area of its size in the United States, and that it probably contained the greatest abundance and number of species of animal life wholly uninfluenced by man.

AT THE HEAD OF YELLOWSTONE LAKE

The river delta at the lake is 7,741 feet above sea level and the gradual rise of the river to its headwaters is only about 160 feet in some 20 miles. The valley, walled in on both sides by abruptly sloping mountains, ranging from 1,000 to 3,000 feet in height, is marked here and there on the borders by the entrance of tributary streams. The width of the bottom lands



YELLOWSTONE MOOSE ANTLERS ARE OF THREE TYPES

The generally smaller but more varied antlers of this moose may be attributed, in part, to interbreeding, high altitude, the deep snow, and the absence of a dependable supply of nourishing winter forage. Subsequent investigations by Dr. E. W. Nelson, of the Biological Survey, found this segregated animal to be a geographic race of the well-known eastern moose, and it was named *Alces americana shirasi*.



COW AND CALF MOOSE WADE IN A LAGOON

The mother shows a small tassel, or a "bell," under her throat. All the moose on the author's trips to the Yellowstone country were unusually dark in color.



COW MOOSE AND CALF APPEARED UNCONCERNED

These animals, found in a pond back of the south arm, in a richly wooded district of the Upper Yellowstone, stood calmly while the author photographed them.

along the river varies from one to five miles, being greatest at the lower delta and near the park boundary at Thorofare Creek.

The river, extremely sinuous, is double the length of the valley and, like most large mountain streams, at the immediate base of a watershed and adjoining lake basin, it has filled up its valley to a depth of from 25 to 50 feet with silt, so that on a cross-section measurement the bottom land between the foothills is practically on a dead level. The stream is, therefore, now free from falls or any pronounced rapids, although these doubtless occurred prior to the leveling of the river bottom.

THE LAKE ONCE MUCH LONGER

It is quite likely also that in remote years the lake extended much farther up the valley, for the gradual filling in of the southeast arm of the lake with the soil from the mountain sides still continues. It is possible to estimate, from the age of the growing timber, how far this deposition has advanced in the last 50 years or so.

During midsummer and early fall the

surface of the river lies from two to six feet below the top of the bank, but a careful examination of the driftwood and of the water marks shows beyond question that during a part of each June the bottom lands, except for a few scattered hummocks, are all under water. The result of this annual overflow had an important bearing upon the results of the expedition.

Yellowstone Lake collects and holds the detritus carried down by the river. The course of the river for a number of miles below the lake is broken by a series of large falls and rapids until it again reaches a country of broad, open valleys.

For several reasons it is important to compare, with special reference to its influence on the different game animals, the vegetation along the valley of the upper river with that of the foothills and higher ranges. The bottom lands of the valley consist in part of numerous meadows covered with luxuriant grass, interspersed among which are hundreds of willow groves and forests of lodge-pole pine. Small lakes and ponds provide many aquatic plants.



THE ROCKY MOUNTAIN JAY IS AS SAUCY AS HIS COUSIN

These relatives of the whiskey-jack of Canada have the same confident ways and soon become familiar about camps high up in the forest.

The confluent branches of the Yellowstone are converted by beaver dams every few hundred yards into slack-water pools, which likewise afford green food and the muddy bottoms sought by the moose in the summer months. However much these animals may loiter about the ponds in mid-summer, pulling up tiny sprays of moose grass and other small forms of vegetation, the leaves and twigs of the willow form their staple food during the winter months.

MOOSE STAY IN LOWLANDS

From the foothills to above the timberline grows a great abundance of grasses and many-hued flowers, and lower down forests of pine, red cedar, and the quaking aspens afford a fine summer shelter for the elk and mule deer. The elk may be seen daily descending the slopes to graze on the more tender grasses of the humid bottom lands; but the moose seldom, if ever, leave the bottom land in search of food or cover on the mountain side.

The moose is by nature not a migrant or a wanderer, and unless disturbed by man or forced by shortage of food to change its location, it is content to live throughout its

life in any locality where it finds ready subsistence, and where the cover is sufficiently dense to conceal it from its enemies and to protect it from the wintry blasts. This characteristic tendency to contentment is intensified to an extreme degree in the Yellowstone Valley, where, walled in on three sides by high mountains and on the fourth by a large and deep lake, the moose apparently selects a limited area, and travels neither up nor down the river, nor ascends the foothills far above the valley.

With these animals scattered everywhere in the low country we examined fully 20 miles of plateaus and benches just above the river without seeing a moose, a moose track, any droppings, a hair, or a discarded antler of this species. This limitation of the moose mainly to a valley never traveled by canoe and well concealed from the scout trail that follows the wooded slopes to the eastward explains why these animals were then practically unknown to the guides and to sportsmen from the adjoining States.

In the 10 days we devoted more particularly to moose we saw 68 of these animals. Since on my expeditions in other regions I had usually seen five moose at night under

the jacklight to one observed in the daytime, it is probable that we should have seen fully 400 in this valley had we traveled about the lakes and ponds at night. Even this large number would have been only a fraction of the total number actually in the moose territory.

Another noteworthy fact was the lateness of the rutting season of the moose at this high altitude, as indicated by the condition of the antlers. Only four bulls out of 35 had their antlers free of velvet at the end of September, whereas the elk, of which I saw some 200 bulls, often had lost their velvet by September 10. When we were leaving the valley, the elk, preparing to migrate, were rapidly assembling in small bands under the charge of individual bulls, but I saw no evidence of mating on the part of the moose, and only a few times did I hear a bull calling. Two weeks later I saw bulls with velvet still on their antlers, but evidently mated—an unusual sight.

MOOSE ANTLERS FOUND INTACT

In the first trip up the valley of the Yellowstone I had found no shed antlers, and my conclusions had been drawn wholly from observations of moose seen along the banks of this river as we endeavored to force our way toward the headwaters. On the second trip, after we had picked up the big antler already referred to, it seemed well to look for additional ones, although I hardly expected to find any others in equally good condition.

Going one afternoon into a part of the valley in which moose were frequently seen, I instructed both guides to keep a sharp lookout for shed antlers. In less than half an hour we found three. Two were of the long, narrow type already mentioned, but the third was entirely different in form, being small and almost as broad as it was long, and shaped somewhat like an open fan. To our delight, each specimen was perfect, and in no wise injured by rodents or exposure.

An hour later we came across four more, one of them almost as large and broad as the one found on the first day, another narrow and long, the third of the fan-shaped type, and the fourth of an intermediate form. Two days later we picked up two more. We thus found 10 in all, each one belonging to a different bull. The fact that none of these antlers had been injured by squirrels, porcupines, or mice,

seemed at first very strange, until it finally dawned on us that in these willow bottoms all mice are repelled or destroyed by the annual overflow, and the larger rodents are seldom seen outside the pine thickets.

Loaded down with these heavy trophies, which we would have to transport 100 miles by canoes and wagon and nearly 3,000 miles by rail, we reluctantly gave up the search for more. But since these particular specimens included the three prevailing types represented by the living animals we had already observed, there was perhaps no reason for adding further to the collection.

I had to keep one guide in camp nearly all the time to prevent the antlers from being injured or destroyed by the numerous red squirrels, which, on several occasions, when we were not watching, entered camp and gnawed at the points.

When, on our return trip in the last week of September, we reached the southeast arm of the lake, the two guides climbed to the top of the high ridge behind camp to prepare a rousing fire as a signal for Hofer, 25 miles away at the outlet of the lake. He would thus be notified to come with his launch on the day following.

I had intended to join the guides just before the fire was started, but when I was part way up the mountain I saw a cow and a calf moose feeding in a pond a little way below me. While watching them with the aid of a powerful glass, I saw three dark animals on their way to the lake shore. These were followed in five minutes by four more. Even without the aid of the glass, it was easy to see that they were moose, for they appeared to be ebony-black in comparison with the light-colored elk that surrounded them.

SEVENTEEN MOOSE IN SIGHT!

These moose waded out into the shallow waters near the mouth of the Yellowstone and evidently began feeding on water plants. To add to the excitement, three more moose appeared, and almost immediately afterward five others, and all these soon ranged themselves along the shore with the first, so that within a radius of less than half a mile I had 17 moose in sight at one time—a picture never before equaled in my 20 years' trips to regions where moose were considered most abundant.

Since I had already added to my list ten animals seen within the area in which these were now feeding, I struck these ten from



THE MAIN CAMP ON PEALE ISLAND WAS IN MOOSE COUNTRY

This beautiful camping place on Southwest Bay, near the head of Yellowstone Lake, was ideal. The animals were all about it by day and by night and often appeared in front of the tents. In the adjoining bay the author saw more cow and calf moose than during two seasons of looking for them on the Upper Yellowstone River.



A BIG SHIRAS MOOSE AND TWO CALVES VISIT A BEAVER POND IN THE UPPER YELLOWSTONE VALLEY

In the background is one of the heavy pine forests which harbor the animals during the winter. The adjacent willow thickets provide nourishing bark after the coming of the deep snows, just as the numerous beaver ponds afford choice summer food. One bull has two of the three prevailing types of antlers, the left being round and long, like that of an elk, while the right one is heavy and broadly palmated.



THE UPPER YELLOWSTONE VALLEY WAS THE HOME OF PROBABLY 1,500 MOOSE

Beneath the ridge, on the opposite side, flow the swift, cold waters of the Yellowstone, and in the foreground is Trail Creek, with two young bull moose feeding close to a beaver house (left foreground). This valley, situated at an elevation of 8,000 feet, is hemmed in by steep ridges varying from 600 to 1,500 feet in height, except where drainage ravines cut back short distances.

my count in order to eliminate any possibility of duplication. Only in the last three days had I seen at close range any bulls with the short, wide antlers of the type mentioned. A comparison of the long, narrow type with the equally long, but broadly palmated type affords no greater contrast, marked as it is, than is seen when either of these forms is compared with the short, broad-antlered type.

Instead, therefore, of the moose of the Rocky Mountains showing characters of unusual uniformity representing a single unique type, as I was at first inclined to believe, it can safely be concluded that they may show greater variations in formation than other members of the species anywhere else in its great range. In other words, extreme isolation and residence in a high altitude may be factors that are working toward a diversity rather than uniformity of antlers.

From the mouth of the St. Lawrence River westward, on both sides of the boundary waters, through Minnesota and Ontario, and in Alaska, I have seen hundreds of moose antlers, but they showed much less divergence in form than was shown by those of the moose of the Upper Yellowstone.

I brought out a dozen of the best antlers, and the residents of Gardiner expressed astonishment at the sight of antlers they had never before seen in Montana, although the animals that had borne them lived barely 50 miles away. This collection, now in the possession of the Biological Survey, represents the three distinct types mentioned, with several intermediate variations.

PREDATORY ANIMALS AND GAME

The third day up the river I ran across the carcass of a cow moose that had been killed some months before by a mountain lion, or by wolves. When we remember that every deer and every elk leaves this high altitude before November, and that the larger predaceous animals must either live upon the young moose or get out of the country, may it not be, with the great increase in the numbers of the moose, that the wolves and mountain lions have found a sufficient food supply to maintain themselves during the winter without now being compelled as formerly to seek the lowlands? Twice we heard coyotes and, on another occasion, timber wolves. Just back of camp

we found the carcasses of two elk, but could not tell by what animal they had been killed.

With the snow more than five feet deep on the level and all the moose segregated into yards each winter far away from the nearest military post or station, the conditions favor destructive raids by the cougar and the wolf. The same peril existed at the head of the valley in Wyoming, where the hunters and trappers were excluded from the forest reserve under a closed season, and no one was in a position to hold in check a class of predaceous animals capable of thriving even under adverse conditions.

WHITE-TAILED DEER

I saw on this trip to the Upper Yellowstone just one white-tailed deer. The white-tail was always uncommon at such elevations, being more at home in the lower, or what might be called the foothill country, where they found food and shelter among the cedars, or among the alders, aspens, willows, and other deciduous growths.

Since the time of my visits it has been reported that they have disappeared from the park. In my opinion this was caused by the invasion of their feeding ground each fall and winter by great bands of elk and smaller numbers of mule deer and moose. This not only deprived them of food but created conditions so unpleasant that they had to seek other haunts.

Our camp on the Upper Yellowstone was enlivened by visits from Rocky Mountain jays. These pale-colored relatives of the whiskey-jack we had become acquainted with in Newfoundland are equally entertaining camp companions, with boldly inquisitive ways. Their habit of helping themselves to any food left unprotected has earned them the common name of "camp robber," and it is true that their performances are often exasperating, even to the most friendly inclined camper.

Here we learned, also, that these birds, like their more northern relatives, nest in February or March, at a time when the winter cold is so intense that the eggs and young in the thick, warm nests must be brooded continuously. The birds' choice of this strange nesting time is difficult to account for, since it occurs not only at the coldest period of the year, but also when the food supply for all wild things is scarcest.

On one trip out from our camp at the southeast corner of the lake I walked along



A BULL ELK APPEARS WITH HIS HAREM OPPOSITE PEALE ISLAND

During the mating season in the fall, the old bulls gather little groups of cows, which they hold together and guard jealously. The master of this herd goes alertly ahead of his consorts.



ELK ABOUND AT THE SOUTH END OF YELLOWSTONE LAKE

Throughout the river valley they occupied the hills above the moose, coming down often to feed in the valley meadows. They ate some willows, almost the sole dependence of the moose in winter. By October 1 they began migrating to lower ground.



INTERCEPTED, IT WONDERED WHAT TO DO

This large bull elk, crossing a narrow inlet leading into Yellowstone Lake, sighted the author awaiting it with his camera; hence its hesitation and look of suspicion.



A COW MOOSE WITH TWIN CALVES WAS A VISITOR AT SOUTHWEST BAY

These animals were not easily frightened, for their presence had never been suspected by the legion of hunters that pursued their kind in the East. It was not until the author penetrated their range and photographed them that the public realized that they were not elk or caribou.



A BIG BULL ELK WALKS HEAD FIRST INTO A FLASHLIGHT STRING

Here the camera and flashlight apparatus faced the opening between the stake and the tree on the right. The animal probably caught the string in his antlers.

the foothills for nearly half a mile to a place where there was an unobstructed view of the river delta below. Near the edge of a steep bank a spring had formed in the clay a small basin that was rimmed with bright-colored moss.

Its clear purity and coolness tempted me to try it. I was surprised to find it a highly charged effervescent water that seemed to surpass in quality any I had tasted before. This little spring proved so attractive that other members of the party visited it daily, and became firm in the belief that there were few if any equaling it in this country.

Its resemblance to Apollinaris water was most striking, and it was far superior in quality to the much exploited spring of that name situated on one of the main highways of the park. This water might be piped and bottled at the spring for the use of the tourists, who would doubtless prize it,

not only on account of its high quality, but because of its origin in one of the subterranean natural laboratories of the park.

A LAST TRIP TO THE UPPER YELLOWSTONE CAMP ON PEALE ISLAND

My last trip to study the Yellowstone moose was made during September and October, 1910. We camped for two weeks on Peale Island, in the long south arm of the lake. This locality proved to be as little frequented by man as that on the other side of the dividing promontory. The island, beautified by a fine growth of trees, made a splendid camping place, from which we could watch moose and elk day after day.

This area seemed to be the nursery of the cow moose, for fully 80 per cent of the 400 moose seen here were cows and calves.



A MOOSE CALF STOOD QUIET FOR A CLOSE-UP

Finding it feeding some distance from its mother, the author approached to within 15 feet in a canvas canoe covered with pine brush. Note its splendid condition and the reflection in the water.

On the second afternoon 21 moose, including two bulls, appeared at one time in the shallow water of the bay, a sight rarely witnessed even in districts where this animal is deemed most abundant.

I think it can be safely said that at that time 1,500 moose were living throughout the year in the valley of the Upper Yellowstone, an area only 20 miles long (see map, page 363). Until a visit is made in midwinter on snowshoes, when the animals have yarded, it will be impossible to estimate the number accurately.

MOOSE ENJOY WINTER SOLITUDE

When the first flurries of snow come in the Upper Yellowstone Valley, and the frost nips the meadow grass, the elk depart for the lower ranges, leaving the moose in their home, where amid snow, ice, and zero weather they live in contented seclusion under the towering crest of the Rockies.

In our ascent of Yellowstone River on the first trip, and in that of 1908, we saw

a total of about 30 cow moose. The total number of calves observed was only three, a number so amazingly small, considering the fact that we were there both in August and September when the calves usually accompany their mothers, that I made a special effort to find one whenever a cow was located. I also examined the runways and beaches for tracks of the young. But all this was to no purpose. What was equally significant, we saw only four yearling moose.

This scarcity of calves caused me to fear that through the depredations of predatory animals or some other cause the young animals were being destroyed to an extent that might have serious consequences to the species here. Fortunately, on the last trip, in 1910, these misgivings were allayed by my discovering many calves concentrated in another locality.

From my first sight of a Rocky Mountain moose to my last trip three years later I was impressed by the darkness of their



A COW ELK TAKES ITS PICTURE AT NIGHT

During the rutting season of the elk, in September, 1910, these animals moved about somewhat at the full of the moon. The camera had been set for moose, but got the best female elk in the author's collection.

pelage. Frequently in bright sunlight I got within less than 100 feet of these animals, and in each case the fur, excepting on the legs, was a dark brown verging on black, in contrast to those I had seen in Minnesota, western Ontario, and New Brunswick. A few years later I was equally surprised by the light reddish-brown color of the moose on the Kenai Peninsula, Alaska, this color so blending with the red soil that it was often hard to distinguish the animals.

NO FOOD PLANTS IN COLD STREAMS

On my first trip up the Yellowstone River I received the impression that in contrast to the moose in most other parts of the country the moose of this region did not rely upon water plants for their summer diet. This impression was doubtless based upon the absence of aquatic plants in the swift, cold waters of the upper river, along the banks of which I saw most of the animals at that time.

On my subsequent visits it became apparent that the moose depended largely upon water plants instead of eating the willows growing along the bottoms, which remained for winter use. To the warm, sluggish pools on tributary streams made by beaver dams, or the large shallow bays at the south end of the lake, moose came throughout much of the day as well as at night. The series of accompanying pictures is practically limited to moose searching for water plants.

One morning I went up the little stream flowing into the lake close under the western hills, where I knew there were many ponds above beaver dams. At the first one I found a large bull moose, a cow, and two vigorous looking calves. Since it was late in September, the mating season had just begun. Most of the time the bull was motionless, not deigning to partake of any food, but uttering low grunts expressive of his courtship.

Concealing myself behind a clump of bushes, I took a seat on the fiber camera box and prepared to get some pictures of the group. The calves were feeding within a few yards of the bull, the cow standing farther away, so that all could not be included in a picture.

After getting several views of the bull and calves, I endeavored to drive the cow into closer contact with the others. This I tried by standing and clapping my hands.

For a moment all the animals looked across the pond and then one calf ran to its mother. With her head up, ears turned forward, and nose twitching to get the scent, she suddenly started for the woods beyond, the calf at her heels. Meanwhile the bull was looking at me stolidly and seemed not to take alarm until he noticed the flight of his partner. Then he swung about, and in a deliberate way moved toward the woods with the other calf in his wake.

As is so often the case under such circumstances, the bull finally broke into a run after making up his mind that this was the safe course. Meanwhile the mother and her detached twin had entered the woods. The other two took a course farther to the south and went into a jack-pine forest a quarter of a mile beyond. I had no means of determining whether the group came together again.

This bull showed a combination of the two prevailing types of antlers, the left antler being long, narrow, and forked something like that of an elk, while the other antler was large and broadly palmated with many points. I saw this eccentricity in antlers further illustrated a week later when I found what looked like a three-year-old bull wading about in a large pond. This animal had a narrow, solitary antler nearly three feet long extending from the center of the head. It resembled the mythological unicorn. Of course, it is possible that one antler had been detached by some sort of an accident; yet the central position of the one the bull bore indicated very strongly that the usual pair had not been present at the beginning of the season.

A MASTER OF AN ELK HAREM

The rut of the elk occurs chiefly in October, and the period of gestation is approximately eight months, the young generally being born in June. On the approach of the rutting season, the clear buglelike call of the bull elk rang from the beautiful parks on the mountain sides as a challenge to his rivals and as a notice to the females that their lord and master was preparing to round up his harem. It was now the mating season of the elk. No more exciting scene can be imagined than the great bulls fighting for supremacy, while the cows and calves stand by with apparent indifference.

I passed the later afternoons studying elk in meadows half a mile to the south of our camp on Peale Island, bringing the animals

within easy vision with a powerful pair of binoculars. It was the beginning of the rutting season, and each of the large bulls presided over a herd of docile cows, that with their calves fed unconcernedly, while the bull saw that none wandered too far away and that no rivals interfered.

The elk are the only branch of the deer family in America in which the cows are herded by a master bull during the mating season. One day the largest bull I had yet seen had rounded up about two dozen cows. While the latter grazed, the antlered monarch strode about, never lowering his head for a moment to partake of the tender meadow grass. Finally two cows strayed off, and the bull started to bring them back, but they took to their heels and a chase began across the meadows.

A BULL ELK'S STRATEGY

Soon it was easy to see that the runaways were increasing the distance between themselves and their bulky pursuer. The bull stopped and began nibbling at the grass. The ruse was successful, for the two cows also stopped and began to feed. Gradually the bull made a semicircle until he got beyond them, and drove them back.

A little later there was another getaway, but this time the pursuit led to a heavy forest, where the bull gave up in disgust. At this moment a second large bull came on with a rush, in evident surprise at seeing a ready-made harem without a master.

It now looked as if a battle royal was imminent; I could see the first bull returning to recapture his flock. The interloper, however, was satisfied after detaching half a dozen cows, and departed with his prizes. On reaching the now depleted herd, the old bull evidently decided that it was better to keep what he had than to enter on a chase that might result in the loss of all his family.

Just as darkness was descending an amusing encounter occurred. I had been watching an immature bull taking a mud bath in a wallow near the lake. Rising, covered with a coating of mud, very much as if he had donned a suit of mail, he made for the big bull. The two met head on, and the smaller one was thrown back on his haunches. Then began a pushing match in which the intrepid rival was forced steadily backward until he reached the water. He disengaged his antlers and ran out into the shallow bay, while the victor shook his great head threateningly.

Finally, apparently impressed with the idea that he had put up a pretty good fight, the little bull boldly waded ashore. Then came the knockout, for the big stag made a terrific lunge at him, and down he went full length, remaining motionless and apparently dead. Satisfied with the outcome, the big bull returned to his neglected family as darkness closed on the scene.

That night we argued over the legality, as well as the ethics, of having an elk roast on the following day, for such feasts were proscribed in the park. The next morning, however, there was nothing to be seen of the little bull. We concluded that his motionless form had been only an indication that he was discreetly taking the count in the final round.

Like the caribou, the elk feed mostly during the day, but in the mating season, especially on moonlight nights, they wander about, the bulls bugling as they go. Two automatic flashlights set out for moose one night revealed a big bull elk following the scent and a fine cow, apparently motionless, as her foreleg pressed against the string that ran to the camera (pp. 330 and 332).

Another interesting sight on the meadows opposite the island camp was the rubbing of trees or bushes by the bull elk. The antlers at this time had been entirely free of velvet for more than three weeks, and this "horning," therefore, was not for the purpose of removing the velvet, as so many suppose, but was a masculine demonstration at the beginning of the mating season when dexterity in the use of the antlers would determine which contender should be master of the harem.

BULL ELK FIGHTS AN IMAGINARY FOE

Late one afternoon an unusually large bull elk approached a solitary yellow pine, the lower limbs of which extended nearly to the ground. When within 10 yards, the animal, with head erect, and the massive antlers glistening in the sunlight, eyed the tree carefully, uttering a buglelike note as if challenging an imaginary foe. Then lowering his head he advanced, shoved his antlers among the branches of a lower limb, and twisted them about in a leisurely way. In a few minutes he withdrew a short distance and returned at a more rapid pace. After warming up by several bouts of the imaginary battle, he renewed the attack each time with more vigor. Finally he pushed back a large limb so that it became



A COW MOOSE SPRINGS THE FLASH FOR ITS OWN PICTURE

Unlike the elk and caribou, these animals are confirmed night feeders. This photograph was taken where a moose trail led from the forest to a number of ponds.

momentarily engaged with one beyond. This limb snapped back into place and struck him a severe blow on the nose.

The blow seemed to indicate a foe worthy of more serious attention. Backing off a few yards, the bull came on again with a rush. He pushed the offending limb back farther and farther, his hind legs sinking deep into the sand. Suddenly the limb broke with a crash that I heard across the bay. Satisfied with having brought to the ground its erstwhile opponent, the elk marched off trumpeting its success.

Later in the week another bull approached a clump of willows and shoved his long, sharply pointed antlers among them, twisting them to the right and left, or up and down in a regular movement, but displaying none of the pugnacity of the previous bull. An examination of the willows showed much of the bark stripped from the branches. In this instance the animal may have been polishing its antlers for future use rather than testing their strength in a mock battle.

This sparring and fencing is common to all our antlered animals at the mating period. Horned animals, too, such as rams, goats, and domestic cattle often do it. The males undoubtedly regard their head gear

as armament to settle individual disputes rather than as purely ornamental appendages.

In the summer months I passed in the Upper Yellowstone Valley I heard no calling by bull elk. With the coming of the first frosts in fall, however, their clarion calls could be heard well up on the mountain side, where they passed the season while their antlers were in the velvet. It was a majestic sight to see one of these great stags standing on some small elevation on the general slope with its noble crown of antlers glistening in the sun. From such vantage points with slightly lowered heads they would send forth their challenge call to any possible rival.

THE BULL'S BUGLE CALL

These calls begin as low tones and rise until they reach high, clear buglelike notes, which quickly end in a series of grunts. These notes are quite different from the whistle or snort of the white-tailed deer, or the bleating of their fawns. It is equally different from the loud wail of the cow moose and the guttural response of the bull.

Mr. O. J. Murie, who has made a study of the elk in the Rocky Mountains, summarizes the notes of young and old thus:

"Elk calves give voice to a squealing call, to which the mother replies in a deeper voice. Adult elk express alarm, concern or curiosity by a sharp bark. Adult bulls in the rutting season, and cows in the spring during the period of parturition, give emotional expression by bugling, most highly specialized in the bulls. Elk calls, for the most part, are an expression of individual feeling and do not appear to be in the nature of direct, conscious communication."

AN ISLAND HAVEN FOR MICE

Our little island was densely populated with mice. Never before had I seen or heard of such a popular gathering place for them. The absence of foxes, coyotes, skunks, and weasels probably accounted for some of the abundance.

Late the first afternoon, just as the sun was setting, I noticed several little red-backed mice feeding on green ground vegetation. They resembled, in shape and color, miniature muskrats. After darkness had descended and the campfire cast a cheerful glow about our tent, there came an ever-increasing number of white-footed mice. These scampered about just like their relatives, whose graceful forms, long ears, and slender tails I had admired in Michigan.

After we had gone to bed the mice indulged in some strange pranks. The tent in use was supported by a pole in front and sloped steeply back to a two-foot wall. There was ample ground space for the three of us, but one could stand erect only at the front of the tent. The covering was thin canvas thoroughly saturated with paraffine. In the daytime the canvas was soft and pliant, but during the chill of a mountain night the surface became stiff and smooth.

We had been in bed only a little while when we heard some odd sounds on the steep slope of the tent. The moon, being nearly full, disclosed small dark forms climbing up to the apex of the tent, turning there, and sliding down the full length of the canvas. They slid as straight as boys on a toboggan slide, and seemed to enjoy the sport quite as much as an otter

enjoys its slide on the clay bank of a stream.

This unexpected form of entertainment finally interfered with our rest, so we procured short sticks, and whenever a mouse became visible on the white canvas we would catapult it away. Thus we soon put an end to the evening performance.

At dark each evening we had noticed owls crossing over from the main shore. The presence of the mice suggested the reason. At times there must have been a dozen of these night marauders in the large pine trees back of the tent, but being on a hunt they were unusually silent, and only once did they indulge in vocal expression. On this occasion there seems to have been a family row, or more likely an inter-racial battle, for birds of prey are disposed to maintain exclusive hunting privileges in particular areas.

I became confirmed in this opinion when I found a dead screech owl with a crushed skull. I think it had fallen a victim of the great horned owl, which seemed to be the principal visitor to the island. I had never before found a dead owl except where man would account for it. Undoubtedly, these owls helped to a certain extent to reduce the great annual surplus of mice. Perhaps many of the mice went ashore each winter over the ice, but more probably perished. Otherwise there would have been insufficient food to maintain many of them.

MUSKRATS BUILD RAPIDLY

One morning at Peale Island, I found a pair of muskrats asleep in a newly made nest of grass built in the sheltered space beneath the bottom of the bow of a flat-bottomed rowboat pulled up on shore. On two succeeding nights the boat was pulled up in different places near by, and each following morning a similar new nest had been built under the bow as before.

The material was abundant and handy, and the nests were easily made. These occurrences convinced me that the muskrats in this locality must have the habit of building nests under the shelter of fallen tree trunks or other similar refuge along shore.

CHAPTER XIV

General Notes on the Yellowstone National Park

THE publication in the NATIONAL GEOGRAPHIC MAGAZINE, in July, 1913, and later in *Forest and Stream*, of an account of my experiences with the Yellowstone moose resulted in an unexpected and gratifying sequel. The articles aroused the scientific interest of Dr. E. W. Nelson, and at his suggestion, and with the consent of Governor Joseph M. Carey, of Wyoming, I cooperated in the collecting on the Snake River, a few miles south of the park, of a fine adult bull and cow for the Biological Survey collection in the National Museum at Washington.

Comparison of these with moose from Maine, Nova Scotia, and New Brunswick confirmed Doctor Nelson's idea that the Rocky Mountain animal differs from the typical eastern one and represents a geographic form previously unknown to science. He considerably named the new type for me, *Alces americana shirasi*. The fact that this new race is peculiar to the Yellowstone National Park region gives it special interest to both naturalists and lay visitors to the park and makes its perpetuation highly desirable.

SHORT OPEN SEASON GRANTED ON BULL MOOSE IN WYOMING

During the years that have passed since I first drew the attention of the public to the presence of many moose in the Upper Yellowstone Valley, these animals appear to have increased in numbers. They are now known to occur in much of the southern part of Yellowstone National Park and in the adjacent territory in Wyoming. In winter some descend regularly to Buffalo Fork Valley, and occasionally even wander southward across the Snake River Valley above the Elk Refuge, near Jackson.

They became so numerous in this area south of the park that the Wyoming Legislature in 1921 passed a law authorizing the State Game Commission to declare an open season on them, and under a limited license system to issue up to 100 licenses to kill one bull each season. In later years the number of licenses has been reduced to 50, with one bull allowed to each.

Previously these moose had been under protection for many years, and this protec-

tion should continue within the Yellowstone National Park, in which most of them have their homes. Placing an open season on these animals, even in the limited way stated, alarmed many conservationists who were not personally familiar with conditions in the country affected. Among inquiries came a letter, dated November 22, 1927, from Mr. Madison Grant, president of the Boone and Crockett Club. I replied:

OPEN SEASON BENEFICIAL

"The three seasons I devoted to the moose in the Yellowstone region and my familiarity with subsequent events lead me to think that a short season and a kill of 100 bulls will not prove disastrous to the restoration of this fine animal to the adjoining States. There is a limit to the summer and winter food supply for the moose in the Upper Yellowstone, and this I think may have been reached some years ago.

"Unlike the deer on the Kaibab Plateau, Arizona, where all suffered starvation when the food was exhausted and the surrounding desert prevented migration elsewhere, the moose of the Upper Yellowstone have a chance to migrate when gradual starvation threatens. A hundred-dollar license for each bull and the expense of a registered guide mean that practically all of the limited number of bulls permitted to be killed will be from among the big old ones—thus allowing the three and four year old bulls to escape the gun. Consequently the breeding stocks of bulls is ample, probably averaging one for each cow. The death of a bull reduces the herd by only one the next year, whereas the death of one cow with its successive offspring of 10 years means the loss of 65 bulls and 65 cows, as shown by the calculation made by Dr. A. K. Fisher of the Biological Survey at my instance.

"The moose, like the whitetail, averages one and one-half offspring after the second year. This is one of the reasons why moose and deer can be restored more quickly than elk or caribou, which bear only one young annually. Therefore, in view of the fact that hundreds of adult bull moose must be dying each year of old age, it seems only proper that some of these should be killed



PEALE ISLAND IS A PRETTY SPOT IN YELLOWSTONE LAKE

This heavily wooded island, like many others, would be obliterated if the waters should be dammed at the outlets for commercial purposes.

in those localities where the males are abundant.

"If these views are accepted as reasonable, shooting can be stopped any season when the facts seem to justify it. If, in 1908, there were more than 1,500 moose in the Upper Yellowstone Valley, a very moderate annual increase would be beyond the summer and winter food supply.

THE FOOD SUPPLY A PROBLEM

"These animals stay on the floor of the upper valley throughout the year and do not move to lowlands in fall, as do the elk. I fear that the food shortage is likely to take place in the winter months, for the main supply consists of willows and aspens (much sought by the beaver), and the conifers. When these latter are trimmed beyond reach of the animals and the seedlings are destroyed each year, dangerous conditions must inevitably result.

"It should be borne in mind that there are probably 2,500 moose in the Yellowstone-Wyoming area. This means an annual birth of bulls that should exceed 700. The killing each year of 50, most of which are past their prime, would prove negligible so far as their effect on the maintenance or the continual increase of the rest of the herd is concerned.

"Each year I have become more and more reluctant to favor the killing of any of our game animals in numbers that might endanger their future, but in the present instance sound conservation, together with a fair regard for the interests of sportsmen, seems to warrant a very restricted kill under the Wyoming law. The great game refuges of this country must be largely justified by allowing the taking in the

adjoining areas of some of the surplus animals, especially when such killing is limited to males, and above all, when the increasing number of animals threatens the continuance of an adequate food supply."

One of the advantages of Yellowstone National Park, in addition to its size, beauty, and accessibility, is its inclusion of two kinds of country. One section contains the geysers and other strange natural phenomena, well-constructed highways, hotels, and prepared camp sites where the multitude of visitors congregate. The other, mainly in the southern part of the park, is accessible only by launch, canoe, and pack train, by way of the streams, lakes, and borders of valleys, or through rough mountains. The existence of these primitive and unspoiled wilderness areas affords a most interesting contrast in the general utilization of the park.

PERPETUATION OF BIG GAME AND THE YELLOWSTONE PARK

The continued existence of from 25,000 to 40,000 elk within the Yellowstone National Park and adjacent territory is unquestionably due primarily to the protection that has been given them through the establishment and maintenance of the park as a wild-life sanctuary. This is obvious to any one familiar with the fate of big game elsewhere in most parts of the Rocky Mountain region. The same circumstance has enabled the Yellowstone moose to survive and has also perpetuated herds of mountain sheep.

The Yellowstone is the last stand of the rapidly vanishing grizzly bear within the



A PLEASANT VISTA OPENS ACROSS BIG MEADOWS AT THE HEAD OF YELLOWSTONE LAKE

The lower end of this scenic valley would be destroyed if Yellowstone Lake were raised. Thus wild life would suffer hardship, and a fine recreation area would be inundated.

United States. This noble member of our fauna has already gone from most of its former range and is rapidly approaching extinction south of Canada except in this park, where it now outnumbers in population its kind in the rest of the entire country.

To have exerted such a powerful influence is a most interesting and notable accomplishment, for which the park management is to be congratulated. Other national parks and national monuments also are doing their part in the conservation of wild things. In this connection special mention should be made of the favorable effect the establishment of the Olympic National Monument has had in the salvation of the splendid Olympic elk from the destruction that has befallen its kind in most other parts of the Pacific coast region.

With the establishment of refuges for big game it must be kept in mind always that unless such refuges are so situated that the animals have free passage into the surrounding country or the surplus is otherwise controlled, the natural increase will inevitably overstock the area and destroy the limited forage produced. The result

will be starvation just as would be the case if domestic animals were involved.

In many instances even the forage in the areas surrounding the refuges may be too limited to care for the surplus safely. To meet such situations, State laws should authorize the conservation authorities to control surplus game animals in a practical manner.

OUR NATIONAL PARKS—OUT-OF-DOOR UNIVERSITIES

The establishment of national parks in the United States and Canada has received general commendation. Through personal visits to some of the parks and through information gained otherwise, I have been deeply impressed by the growing appreciation by the public of these wild and picturesque places. They are filling a place in the life of this country far beyond anything dreamed of by their originators. In 1934 more than three and three-quarters millions of people visited our national parks, and the number is increasing yearly at a rate that is causing some concern to those in charge.

As a trustee for many years of the National Parks Association, I have seen this

organization, with the support of the public, successfully defend national parks from commercial exploitation and aid in establishing and maintaining proper standards to govern the selection of areas for national park purposes. At the same time active and friendly cooperation has been built up with the rapidly developing State park systems. One of the greatest and most difficult problems has been to restrict the national parks to areas commanding nation-wide interest, and thus avoid interference with the proper field in which the States can develop their own park systems.

"BOOKS IN THE RUNNING BROOKS"

In an article in the *National Parks Bulletin* for July, 1927, Dr. John C. Merriam admirably voiced the public educational value of these areas. He wrote in part:

"For many purposes the purely educational value of our national parks is far beyond that of any regularly established formal educational institutions. Among the most important features are those which concern the nature of the earth—the manner of its building—the forces which have come into play—the meaning of the almost limitless history of earth-making as it is pictured before us. The work of the Creator's hand presents itself here in such a way that all may comprehend.

"Here is much that represents the unmodified primitive life of the world, both plant and animal, remaining just as it was moulded over the mountains and valleys. Nature is said to be an open book to those who really wish to read it, but there are grades and shades of meaning which may be hard to understand. There is certainly no place where the leaves are more widely spread or the print more clear than in these portions of the book."

To make available to the public these advantages, which have a high inspirational as well as educational value, museums have been or are being established in some of the more important parks, and the services of scientifically trained biologists and nature guides are made available each season for the benefit of all interested. Furthermore, at the Grand Canyon National Park, a real out-of-doors university is being established that seems destined to give the public a practical knowledge of Nature's varied forces as they have operated in the past and as they are carrying on today.

Under the cooperative auspices of the Na-

tional Academy of Sciences, the National Research Council, the American Association of Museums, the Geological Society of America, and other organizations, under the leadership of Doctor Merriam, there has been inaugurated at the rim of the canyon a series of what may be called research lectures given by highly qualified scientists on the many phases of Nature's activities in that vicinity. The lectures cover the geology, the fossil records of past geological ages, and the existing animal and plant life, with special reference to ways its development has been affected by varying climatic conditions, from the hot, arid bottoms of the canyon up to the cold, treeless, subarctic summit of San Francisco Peak only a few miles away.

Besides its other features of wide interest, the surrounding region is probably the best in this country for the study of notable existing Indian tribes, and it is the richest field known within our borders for its prehistoric records of man. I am convinced that the educational work undertaken here will have an important and far-reaching influence, even beyond the expectations of its pioneers. Certainly no better service can be given the people of this country than to make them more familiar with Nature and its operations in places where they are inspired and awed by the magnificence of its manifestations.

NO DAM SHOULD BE PERMITTED HERE

Some ten years after my visits to the Yellowstone Lake region a bill was introduced in Congress that, if passed, would have permitted the damming of Yellowstone Lake at its outlet for the benefit of private interests. Although the measure failed in that and in succeeding Congresses, its sponsors are still active and may revive the attempt.

In view of the havoc that would be caused by the contemplated raising and lowering of the lake's surface, a process that has caused inestimable damage to many other beautiful inland lakes, I presented to the Committee on Public Lands at a hearing May 25, 1920, the following statement:

"In many years of exploration in the wilder portions of the northern continent, I have become familiar with the scenic value and the varied uses of many inland lakes, from both a recreational and an economic standpoint. Few, if any, of these lakes can be compared with Yellowstone in beauty, as

a resort for wild life, or with greater possibilities for popular use. With one exception, Lake Titicaca, Yellowstone is the largest lake above an altitude of 7,000 feet, and it is surrounded by high mountains.

"I have witnessed on many occasions the direct and collateral effect of the raising of lake levels for irrigation, for water power, and for logging on outlet streams, and am, therefore, familiar with the effect such increased levels have upon the adjacent shores, and with the disturbances caused thereby among the fauna and flora. Many of the observations and conclusions



A FEMALE GOLDEN-EYE TAKES THE YOUNG FOR A SWIM

These handsome ducks are common summer birds about Yellowstone Lake. Here the author first saw them on their breeding ground.

that follow are based upon trips I took in 1904, 1908, 1909, and 1910 to Yellowstone Lake and the valley of the upper river.



MANY ARROWHEADS ARE FOUND ON YELLOWSTONE LAKE

Early Indian lore asserted that the red man had avoided the Yellowstone Lake region on account of the weird manifestations of nature found therein. The author found on an island in this lake many finely wrought arrowheads and spear points, ranging from one to three inches in length. They were white, gray, yellow, and streaked. Some were of flint and some of glossy black from the obsidian cliffs of volcanic rock not far away.



SHIRAS MOOSE FIND HAPPY SURROUNDINGS IN THE SOUTH ARM OF THE UPPER YELLOWSTONE

On the third trip to the Yellowstone Valley, the author found the south arm of the lake to be the nursery of the calf moose. Twenty-one moose were seen in the shallow water at one time. The picture shows a cow moose and twin calves.

"In my opinion, the proposed irrigation dam on Yellowstone River just below the lake would cause more widespread and irreparable damage to Yellowstone Lake than the public at present has any conception of. In the first place, one notion that has been sedulously cultivated is the erroneous one that raising the level of a lake, such as the Yellowstone, some five or ten feet is a matter of only temporary injury or inconvenience, and that in the course of a short time conditions would adjust themselves to this change without any particular damage.

"It has taken thousands of years for Nature to create Yellowstone Lake in its present form, and it would take hundreds of years, at least, to overcome the damage caused by such a proposed dam. Much of it would never be overcome if the level were intermittently raised and lowered to permit economic use.

THE LAKE A WILD-LIFE MECCA

"This lake has a shore line of approximately 150 miles, much of it sand beaches, with attractive coves, some seven islands, and at the south end two large bays formed by a promontory four miles wide that extends northerly out into the lake for 10 miles. In the southeast bay is the delta of the Upper Yellowstone River, three and a half miles wide. It contains many small lakes and ponds, and the lake waters are equally shallow for several hundred yards. These warm, shallow waters are filled with aquatic vegetation much used by the moose in the summer and early fall. They are equally essential to myriad wild fowl as breeding and feeding places, for the river water is too cold to produce abundant vegetation.

"Furthermore, in this bay is Molly Island, the only local breeding ground of hundreds of white pelicans. Immediately to the west of this and separated from it by a narrow peninsula lies Southwest Bay, very similar in character, in which lies Peale Island, suitable for camping and especially for observing the dozens of moose feeding in the shallow waters in the vicinity, and the hundreds of elk on the meadows near the shore and on the hillsides.

"By the raising of the lake to the proposed level, all the sand beaches, coves, and all the islands with the exception of one, which would still be marked by a sand dune, would be obliterated, and the water

would cover the lower delta of the Yellowstone for a number of miles. Also access of moose and elk to the western bay would be prevented if the shore approach under the precipitous rocks were cut off.

"This increased amount of water would also prevent the wild fowl from feeding in the south end of the lake, or elsewhere, since many of them are of the non-diving, or marsh-feeding kinds, and would wipe out the breeding islands of the white pelicans, gulls, and terns. Furthermore, this higher level would kill thousands of trees growing along the shores and in the coves, and now affording the only suitable places for camping. Within a short time these dead trees, deprived of the support of their roots, would be blown over and would form an almost impassable barrier to the higher ground beyond. In this dry and rarified atmosphere, they would remain undecayed for 20 or 30 years.

"With the waters rising and falling at different periods, all bushes and ground vegetation near the shore would be destroyed, leaving only unsightly and ill-smelling mud flats, and the now beautifully weathered gray rocks at the present water level would be bleached or banded with the discolored lines of a fluctuating surface.

"It must be remembered that the formation of the present shore line and shallow bays has been caused by the gradual disintegration of the shores of a lake that formerly was rock-rimmed. This detritus, together with the sand washed up by the waves, has in the course of time made permanent beaches, at the outer edge of which grow many varieties of trees, shrubs, and flowers, while the delta of the Yellowstone and the shallowing of the adjacent waters are due to the deposition of silt from the river.

OBVIOUS POINTS OMITTED

"The low banks are now clothed with willow, the winter food of the moose, and by dense clumps of pine into which the moose retreat during severe weather. The injury that would result to the driveway along the western shore and the submerging of the peculiar geyser cone near the shore need not be discussed in detail, since the purpose of this article is to describe features of the lake not generally known.

"The Bill introduced in Congress by Senator Walsh, of Montana, in December,



NORTHERN PHALAROPES LIKE A SMALL LAKE NEAR UPPER YELLOWSTONE RIVER

These graceful little waders, unlike the rest of the snipe family, are expert swimmers, passing most of the time feeding upon minute animal life on the surface. Another oddity is that the male is smaller than the female and performs all the duties of incubation.

1920, provides for the erection of a dam on the river several miles below the outlet. The increased water level would flood the lower banks of the river, and cover more than 150 miles of shore line. In many places the width of this overflow would extend back from the present shore for a mile or more. The bill grants to the State of Montana, or to the organizations to which it may delegate its authority (representing purely commercial interests), the perpetual use of the dam site and overflowed territory. This would amount to thousands of acres in the center of the park.

"The public is using Yellowstone Park more each year, and at present the custom-

ary routes and camping places are overcrowded. Many miles of new roads should be opened in the southern and southwestern portions, the localities most seriously threatened by several irrigation projects now under consideration.

Any action that will circumscribe for present and future generations the largest and most popular of our parks should meet with the energetic resistance of the public, and should be vigorously opposed, as it doubtless will be, by all broad-minded and provident members of our National Congress. No plainer test of vested public rights against selfish private privileges could be imagined than this threatening project."



CHAPTER XV

Mule Deer on Kaibab Plateau, Arizona

OF THE several species of deer in the United States, the whitetail, or Virginia deer, is the most numerous and widely distributed, since it thrives under many varying conditions of climate and surroundings. The blacktail inhabits the heavy Pacific coast forests, one small race ranging north to the islands of southeastern Alaska. The mule deer frequents the foothills and pine forests of the higher altitudes and more open spaces of the West, ranging from the Canadian Rockies, in British Columbia, to central Mexico.

The mule deer is the finest and largest of the three species. It somewhat resembles the elk in habits and in the size and uniformity of the antlers. It is usually mis-called the "blacktail" by local hunters throughout the Rocky Mountain region. This animal is much larger than the true blacktail, and has a stubby white tail tipped with black, enormous ears, a white patch on the rump, and much larger antlers than those of the real blacktail on the Pacific coast.

At one time the mule deer was found in abundance in most of our Rocky Mountain region. Large in size, migrating each fall to lower elevations, sometimes in herds along well-defined trails leading from the mountains to the foothills, and lacking the cunning of the whitetail, this animal, like the elk, has rapidly become reduced over much of its original range.

WHERE THE MULE DEER INCREASED

One notable exception to this statement may be cited, for in one part of their range in the South, which formerly was only sparsely inhabited by these animals, the mule deer in late years have increased until they outnumber their population in any other section of the same size anywhere in the Rocky Mountain region. This area lies within the Kaibab National Forest of northern Arizona, a large part of which President Roosevelt set aside in 1906 as a game refuge. This National Forest and game refuge crowns a great plateau, which is almost surrounded by a desert except in the south side, where the Grand Canyon of the Colorado presents a barrier to free movement.

The plateau has an elevation of from 5,000 to 9,000 feet. It is about 50 miles long and 40 miles wide, a strip about 10 miles wide to the south being included in the Grand Canyon National Park. The area in the national forest, however, does not include the foothills at the base of the plateau, the winter home of the deer.

The summit of this plateau, although heavily forested, has scattered here and there open glades and parklike meadows that produce considerable grass and other food for grazing animals, including cattle.

INACCESSIBILITY A BOON

Such a tract was ideal for the gradual building up of the stock of native deer, for they could not wander forth freely into unfriendly territory, since the arid plains and the precipitous Grand Canyon form the boundary of their native range, nor could poachers take much toll, for few settlers lived in the neighborhood. Furthermore, the means of conveyance were unsuitable for the encouragement of unlawful traffic in large game, the nearest accessible railroad being 160 miles away to the north.

Under the efficient supervision of the National Forest Service and the Biological Survey, such predatory animals as the cougar and the coyote were quickly reduced in numbers, and this islandlike retreat was permitted to foster an annual increase of deer probably unparalleled in any other part of the country.

During October and November, when the ground is covered with snow, which by mid-winter sometimes reaches a depth of more than eight feet on the higher elevations, the deer migrate to the foothills bordering the desert country, where the scrubby growth of juniper and cedar and several kinds of deciduous shrubs have in the past furnished them shelter and food for the winter.

The decrease of forage on the Kaibab Plateau, owing to the increasing numbers of deer, has been evident for some years. It has resulted in a gradual reduction in the number of livestock permitted by the Forest Service to be grazed there.

Within the last few years the problem of the perpetuation of the increasing numbers of deer on the Kaibab has become so serious



TREES SHOW INFALLIBLE SIGNS OF TOO MANY DEER

The well-marked, light-colored band along the base of the aspen grove shows how the deer have destroyed all the small branches and offshoots up as high as they can reach. Such a denuded line on trees in a range always means that the game is too numerous and must be promptly reduced.

that the Forest Service requested the Biological Survey to investigate conditions and make recommendations for the future management of the herds.

Without now considering in detail what others saw and what they reported, I shall confine myself to my own investigation in that locality. Previous to visiting the Kaibab Forest early in the fall of 1923, and at the request of the Biological Survey, I prepared a summary of my experiences in protected areas in which deer, moose, elk, and other animals by unchecked increase had been reduced to acute starvation. This paper was entitled "The Increase of Game on Limited Areas." The opening paragraphs will be substantially quoted as pertinent to the present discussion.

"A refuge for large game animals, when ever fenced or limited by natural barriers, sooner or later develops a state of acute starvation among its habitants. The loss in one or two seasons may amount to 50 per cent, and ultimately may include the entire herd, unless food is supplied regularly thereafter or the number of animals is reduced by shooting, by transportation from the area, or by such natural agencies as dis-

ease or the free range of predatory animals.

"This condition applies to all game reserves, however well situated, and whether the initial herd be 5 animals on 500 acres or 25,000 animals with the range of a million acres (unless the area is bordered by territory easy of access and suitable for the needs of the growing surplus). With the deer particularly this is true, for they are the most prolific of our antlered game.

BIRTH RATE AND FOOD SUPPLY

"It has been scientifically determined that one female white-tailed deer and her offspring in a 10-year period will produce 130 animals, and that one dozen does will have 1,560 descendants in the same period. Therefore, however large the confined area, the animal inmates are doomed to starvation unless man steps in or allows Nature's drastic methods of controlling a species to have their way.

"The time to act in any given case should be several years in advance of the starvation period; for, with the protected animals rapidly increasing and the food supply on a proportionate decline, thousands may die in a single season, where only a few may



OVERBROWSING BY MULE DEER CAUSED SUCH CONDITIONS ON KAIBAB PLATEAU

The picture gives an example of the animals' work on a pinyon tree. Under pressure of hunger among the deer even the small pines suffer. These trees were defoliated on the winter range. At one time there were about 40,000 deer on the Kaibab, at least twice as many as the area will feed.

have died the previous year. The cause of such a sudden tragedy may be accounted for in the case of the deer family because of their feeding habits, since they are primarily browsers.

"When the herd is not excessive for a given area, each season's growth of annual and perennial vegetation will suffice; but when the numbers become too large, a disastrous change takes place. Ground vegetation is permanently destroyed; sapling trees, denuded of their leaves, buds, and bark, die; and the larger trees, both coniferous and deciduous, are stripped of their limbs as far as the animals can reach. Though these trees may appear large and thrifty to the casual observer, thereafter they provide no food."

Many cases were cited, showing that, as with domestic cattle, there necessarily must be a limit to increasing numbers of large game on a restricted range, especially where the vegetation is permanently destroyed by overgrazing or browsing.

Impressed with the seriousness of the deer problem on the Kaibab Plateau, and willing to help solve the difficulty, I visited northern Arizona in the fall of 1923.

With my old guide, John Hammer, I left Marquette, Michigan, early in September. During the concluding part of the trip south

of Salt Lake City I gave the desert country closer examination than had been possible on my former visits. Two hundred and fifty miles of travel through this arid region brought us to Lund Station, on the Union Pacific, where a recently opened branch of 32 miles took us to Cedar City, in southern Utah. From this point automobiles are taken for the Zion National Park, or to the northern part of the Grand Canyon National Park.

A GARDEN SPOT IN THE DESERT

Under the guidance of an assistant predatory animal inspector of the Biological Survey, we left Cedar City in a light touring car and paused for the night at the village of Hurricane, where the waters of a small stream, coming from the nearby mountains, are drawn upon before they sink into the thirsty desert a few hundred yards away.

Through the use of this water, shade and fruit trees have made an oasis for the hot and dusty traveler, and afford an abundance of peaches, pears, grapes, melons, figs, and almonds, evidence of what the surrounding fertile soil would produce if given the needed moisture. Interesting, too, were the climatic conditions of this region. Late in the afternoon the thermometer at Hurricane registered 95 degrees; and at midnight



MULE DEER DID NOT WAIT TILL DARK TO SPRING THE FLASHLIGHT

Aspen branches were cut and placed with set flashlight cameras at the edge of the forest bordering a natural meadow. By the lighted sky it is evident this picture was taken before dark.

descended to 80 degrees. The following night on the more elevated Kaibab Plateau we suffered from cold, the temperature dropping to 28 degrees.

Some time before we reached the Kaibab Plateau our attention was directed toward a long, dark elevation apparently mortised into the desert, which, because of the covering forest of evergreen, differed materially in color from the ruddy and almost barren hills we had been passing over or alongside all the morning. This was our destination.

WINTER RANGE OF MULE DEER

On the first slope the scanty vegetation of the desert gave way to scattered cedars, which increased in number until as we ascended, they intermingled with buck-brush and scrub oak. This was a portion of the winter range of the mule deer, a broad belt that circled the entire tract north of the Grand Canyon.

The road from the base of the plateau is constructed and maintained by the Forest Service. For many miles it was of low grade and well surfaced, in striking contrast to the narrow, rough roads leading up to the forest border. Later on the road

narrowed, swinging up and down over small ridges, but it was still of good character all the way to the canyon.

About two-thirds of the way up the main slope began an encircling forest of yellow pine (*Pinus ponderosa*)—straight, large, and nearly limbless to the spreading tops. The ground beneath was barren and covered throughout with the brown needles of the great pines. It afforded neither shelter nor food for ruminant life. At the summit, at an elevation of more than 8,000 feet, the pines disappear and are replaced by dense forests of spruce and fir, with here and there open glades or meadows, bordered with a beautiful edging of aspen, whose white trunks and fluttering leaves relieve the otherwise somber background.

Here we were told to look out for deer, this point being within their summer range and also that of cattle belonging to local ranchmen. Not, however, until we passed beyond the northern drift fence of the Grand Canyon Cattle Company, which controls the remainder of the range, did we see any.

Although intent on watching occasional deer grazing as we passed, I was equally interested in the character of the ground



THIS BUCK ENJOYED AN UNINTERRUPTED FEAST

So hungry were the mule deer on the Kaibab Plateau in Arizona that after the flashlight exploded they would retreat only momentarily from the aspen bough bait put out for them.

vegetation, which was sparse and seemed to consist mainly of young fir and spruce, unsuitable food for any member of the deer family. If other growths existed in earlier years, not a trace was left.

Finally, descending in a graceful spiral, we came into a long, narrow meadow, the largest on the plateau, and known as V. T. Ranch, near the end of which was a large cabin and a group of cottages for tourists. This was a convenient stop for those visiting the canyon, one of the inducements being the opportunity of seeing hundreds of deer coming out of the forest and feeding in the meadow late in the summer afternoons or early mornings.

AN IDEAL SPOT FOR STUDY

The locality was to be our headquarters; for it was considered the most suitable place for examining the deer and their food supply and for visiting the rest of the range.

We reached this lodging place an hour before dark and just in time to join an assembly of tourists who were watching the deer streaming out of the forest on either side and mingling in ever-growing numbers on the lower portion of the meadow,

where were several pools of water at which they quenched their thirst. These pools gave a greener tinge to the closely cropped vegetation.

As I was finishing dinner, I was surprised to see Maj. E. A. Goldman, who had just come from the south rim of the Grand Canyon on mule back, crossing over the swinging footbridge that gave a limited access to the southern end of the Kaibab Forest. This was his third trip to the region. Like the previous ones, it had been made in behalf of the Biological Survey for the purpose of estimating the number of deer, their annual increase, and the character and extent of the remaining food supply.

We found that after 7 o'clock in the morning the deer returned to the woods for the remainder of the day, a few being seen along the borders or sometimes hurriedly crossing from one side to the other.

Although not wild, these animals are timid. They allow a man to approach no nearer than a few hundred yards, and then hurry off in single file. Daylight photography, therefore, must be from a blind. Since the deer usually remain in the shadows until sunset, it is only by chance that



TWO MAGNIFICENT BUCKS SHOW ANTLERS IN THE VELVET

The deer in the rear is chasing the other to make him drop the aspen bough he is holding in his mouth. These large animals of the Kaibab herds had driven the smaller ones from the branches that had been cut and placed there for bait.

properly exposed negatives can be made. The habit of the deer of keeping under cover in the daytime proved to me that I had done well in bringing a number of small cameras and several flashlight machines in case bad weather or the seclusion of the deer interfered with daylight photography.

The program for the first day was to pick out the best places for setting the cameras along the edge of the forest. The remainder of the day was given over to studying the character and extent of the food in and around the park.

On examining the narrow fringe of aspens surrounding the meadows, I found that all the lower limbs within reach of the deer had been trimmed. These trees ranged in height from 12 to 30 feet, and not a single one seen was less than six years old. This indicated that during recent years the numerous seedlings had all been destroyed.

No intermediate growth could be found, a circumstance which showed that for at least five years the aspens, which previously had furnished the bulk of the summer food, had not been available. Later, examination of millions of aspens growing along the borders of this forest for more than a hundred miles disclosed the same conditions.

The condition of the meadows was almost as bad. They looked as if a lawn mower had been in daily use, the grass and clover being cropped to less than half an inch in length. Not a weed or bramble could be seen, excepting a flat, grayish plant, apparently not eaten by deer or livestock, that was encroaching upon and replacing the grass and clover.

GRAZING REPLACES BROWSING

The changed forage conditions here had forced the deer to become grazers instead of browsers. They fed with heads continually held down, just like a flock of sheep, and so closely did they crop this vegetation that it never came to seed. All pasture lands must at times have periods of reseeding, for drought, extreme cold, or overgrazing will sooner or later require the natural replacement of the plants.

As an aid to picture-taking, I had expected to put rock salt near the set camera to lure the deer to take their own photographs. However, since several hundred head of horses and cattle were feeding in the neighborhood, it seemed quite likely that most of my negatives would picture domestic livestock. I changed my plans, cut

down a few aspen trees, and used the small limbs for bait. These provided the deer with a long-missing item on their bill of fare, and at the same time did not offer anything that appealed to the cattle.

Late in the afternoon, when the last camera was in place, we looked back and saw four or five deer headed for the bait. On reaching the first branches some distance from the camera the deer acted like a pack of hungry dogs. Each seized a branch, ran a short distance, ate the leaves and tender twigs, and returned for more.

PHOTOGRAPHING MULE DEER

At that moment four big bucks appeared, and each seemed to divine that an unexpected feast was at hand. Hurrying up, they drove away the does and fawns. When the remaining branches had been much reduced, they began chasing each other about. Realizing that we were soon to witness the taking of the first flashlight picture, we turned the field glasses in that direction.

When only one branch remained, the one to which the thread was attached, the largest of the four bucks tried to drive off the others. One in the endeavor to escape took a flying leap over the bait, and its rear foot touched the thread. A blaze of light and a great puff of white smoke were followed an instant later by the heavy boom of the flashlight powder (see page 352).

The deer, instead of rushing to cover in alarm as we expected, ran only a short distance in the stiff-legged jumps characteristic of their kind. Then they faced the scene of the explosion and looked wonderingly at the cloud of white smoke drifting out on the meadow. In a few minutes they walked slowly back toward the cameras. Another picture could be taken if the apparatus was reset. Cautiously driving the deer away, we accomplished this. Before we reached camp, there was another explosion. We could picture in our minds the scene taken by the first flash, but just what happened on the second was learned only after a journey of more than 2,000 miles.

Before the evening meal was prepared, two more heavy explosions were heard farther down the park. It then became certain that the supply of flashlight powder would soon be exhausted, for we had brought only 12 cartridges. On the fourth night the last of these was fired. In all, 13 large bucks, four adult does, and two fawns were photographed. Only one negative had



THE FLASHLIGHT RECORDED A GRACEFUL LEAP

The author had been gone only a short time after cutting and putting out aspen branches for bait when large bucks came forward eagerly to get them (see text, page 351).



THEY FIRED A FLASHLIGHT AT SUNSET

The bright sky shows that this picture was taken before dark. Through field glasses the author saw both this pair and the buck above as they fired the flashes.



ONE COUPLE SEEMED INCOMPATIBLE

When the deer discovered that a ready-set meal of aspen branches awaited them, all gallantry disappeared. The large bucks chased away all the others, and does chased does and young ones.



SHE WAS CAUGHT IN THE OPEN

This young doe was found in the daytime hunting for grass on the meadow near the V. T. Ranch. The entire area of pasture land was closely grazed.



A REAL CHIPMUNK (*EUTAMIAS*) PERCHED ON A LOG

Seeds and berries were so scarce in the devastated Kaibab that even these friendly little creatures, whose food needs are almost negligible, had a hard struggle to live.

fewer than two deer, a most unusual happening with the automatic flashlight.

Another unusual feature of these night pictures was the action displayed in most of them. With a few exceptions, the contest over the food caused the deer to run continually back and forth, the largest buck usually being the one that furnished the picture. This proved beyond question that the deer, driven in recent years to depend upon scanty grass, were eager to get a taste of the leaves and limbs which formerly had been their mainstay and which had again been unexpectedly placed within reach.

DIMINISHING FOOD SUPPLY

In appraising the diminishing food supply of the deer on the Kaibab Plateau, three factors were involved: first, the present condition; second, the character and extent of the vegetation before any marked depletion; and, third, the feeding habits of the animals during the two periods of abundance and scarcity.

The conditions described at V. T. Ranch were found to exist in all the other glades in which the deer and cattle had largely ex-

hausted the pasturage. In addition to examining the forests bordering the meadows, we made a trip along a recently opened road to the edge of the Marble Canyon of the Colorado River, some five miles to the southeast. Here all the leaves and twigs of bushes and deciduous trees had been eaten by the deer as fast as they were cut by the road builders.

At the edge of the canyon I found several tall bushes covered with tender, green leaves, and wondered why they had not been eaten. The forest ranger accompanying me said that if I would turn up one of the branches I would see the reason. There, beneath each branch, an inch or so apart, was a row of long, sharp thorns, which, if swallowed by the deer, would so lacerate the tongue, throat, and entrails as to cause death. A more careful inspection of these bushes, however, showed that the annual growth of about three inches had been snipped off, there being no thorns under the terminal part.

The hungry deer in accomplishing this difficult feat were unable to see the thorns, and thus must have measured the nearest one by the tongue. These thorn-guarded



THE GOLDEN-MANTLED GROUND SQUIRREL RESEMBLES THE CHIPMUNK

This little fellow and the one shown on the opposite page came one day to share the author's luncheon in Kaibab Forest. Both animals were ravenously hungry.

bushes were the only signs of deer food I saw on the day's trip.

Of one summer resident I asked what the deer had to eat in any portion of this large forest, and he answered cheerfully, "Oh, they get lots of mushrooms." Twice only did I see such fungi—once within a small windfall, where three species were growing in surroundings inaccessible to any large animal; and again, close to the edge of our cabin, where the squirrels were coming daily for them.

EVEN FUNGI FAIL IN DROUTH

Doubtless in August and September there is a considerable crop of edible fungi (for deer can eat many kinds poisonous to man), but this supply is only temporary at the best and most often fail during dry seasons. Moreover, such destruction of nearly all the fungus growth before the spores have ripened, largely prevents reproduction. Upon the meadows I noticed a few scattered puffballs, but none more than 48 hours old.

Probably the most significant observation made on my trip was during an excursion some 15 miles southward to the northern rim of the Grand Canyon. Several hun-

dred yards back from the edge a wire fence had been erected to prevent the deer and cattle from straying into a small area set aside for the summer camps of tourists staying overnight. Within this narrow strip I was able to make a good inventory of the many kinds of vegetation that had been destroyed on the rest of the Kaibab Plateau.

Scattered about were scrub oaks filled with an abundance of acorns, a delicacy most eagerly sought by many animals; also buckbrush, cedar, and fully matured grass and clover, besides a variety of flowering weeds and brambles. This told the story of the former richness of the deer range on the Kaibab, now so greatly denuded of its normal plant life by overbrowsing.

Several days before we left camp 15 or 20 cowboys arrived and began herding hundreds of cattle for the fall drive. One of these told me that the pasturage had become so poor that the removal of the stock was necessary before the animals deteriorated too much to be desirable for the winter market. The drive was being made more than a month in advance of the usual time; and yet the number of cattle has been reduced nearly every year under Government

orders. One of the oldest of the herders said that 15 years before these now bare upland meadows had produced grass "stirrup high" and many weeds and bushes suitable for livestock.

When, in 1906, the Kaibab Plateau was made a game refuge, the deer on it numbered only a few thousand; but when I was there in 1923, Forest Service and other officials and local residents estimated the number to be from 30,000 to 50,000. A normal fawn crop for a herd of 30,000 deer would be 10,000 or more.

A DANGEROUS SITUATION

My observations convinced me that this game refuge was dangerously overstocked, and that unless there was a prompt reduction in the number of deer a progressive deterioration in the forage production would be followed by the starvation of the animals on a large scale. I refer here to a reduction in the number of deer only, for the livestock is being gradually eliminated to make way for the purposes of the reservation.

A significant light was thrown on the situation by my observation of a great number of spotted fawns, but only three yearlings and five two-year-olds among about a thousand animals. This meant that out of the large fawn crops of several years only a few were surviving their first winter. A checking of the annual increase by starvation had already begun. My photographs point to the same conclusion, for out of 18 deer pictured not one was under four years of age except a single spotted fawn. That one probably perished the following winter.

If the deer have been starving in large numbers during recent years, then it may be asked why their remains have not been seen. It is on the winter range that the greatest mortality would naturally occur. Reports indicate that 80 per cent of the deer winter on the eastern and western lower slopes and the remainder at the north and south ends of the plateau. This extensive winter range, up to the time of my visit, had seldom been visited.

Thousands of deer might have died from starvation in this large area every winter. Their flesh would have been disposed of quickly by coyotes. The scattered bones would be pretty well destroyed by disintegrating climatic influences and by rodents.

To me the idea of leaving surplus deer to become the prey of predatory animals or

victims of starvation seems an unworthy means of solving such a problem as has developed on the Kaibab. To capture and remove animals for restocking other places would be impracticable, for such action would not decrease the surplus sufficiently.

The sensible way of handling the matter and of bringing the numbers within limits that will permit the forage production to be restored is by hunting. The herd could be permitted to increase gradually as the food supply warrants. The surplus killing should be by means of an open season under cooperative control of the Arizona State Game Commission and the United States Forest Service. If necessary, large numbers could be killed by official orders and sent to charitable institutions. The developments on the Kaibab should be a lesson for those who oppose any killing of wild life, for here this means inevitable slow starvation on an appalling scale.

Largely as the result of my report to the Biological Survey, Henry C. Wallace, Secretary of Agriculture in 1924, appointed a committee of sportsmen and conservationists to investigate the conditions on the Kaibab and report with recommendations for effective control of the situation. The committee consisted of John B. Burnham, of the American Game Protective Association; Heywood Cutting, of the Boone and Crockett Club; T. Gilbert Pearson, of the National Association of Audubon Societies, and T. W. Tomlinson, of the American Livestock Breeders Association.

ATTEMPT TO CONTROL SURPLUS DEER

In accordance with my suggestion, two deer were killed in the morning and two in the evening to determine the food they had eaten. The stomachs of the two that had passed the day in the forest contained nothing but the stomach juices, and those killed in the morning, after they had passed the night in the meadows about V. T. Park, contained a little grass.

After studying the problem on the ground, this committee recommended that in view of the excessive number of deer on the Kaibab and the danger of heavy loss by starvation the reduction of the deer should be accomplished in three ways: first, by capturing and shipping animals alive to other localities; second, by hunting, under careful regulation; and third, as a last resort, by official killing of surplus deer by Government hunters.

CHAPTER XVI

The Author's First Alaska Trip in Search of the Giant Moose

ALTHOUGH my father was a hard-working lawyer whose life was mainly within walls, he had a keen love for the out-of-doors, and for 65 successive years passed much of his summer vacations under canvas on the south shore of Lake Superior. He showed further evidence of his love for outdoor adventure by purchasing and reading all books on polar exploration as soon as they appeared. Through these books my youthful mind was fired with a desire to see the Land of the Midnight Sun.

A WISH DEFERRED FOR 19 YEARS

In 1891 the long awaited opportunity seemed to be at hand when President Harrison took my name under consideration for appointment as Governor of Alaska. This position appealed to me very much, since the duties of the office consisted mainly of tours of inspection, which would give me opportunity to observe closely the rather primitive natives, and especially the wonderful and little-known wild life of the North.

My dreams of life in the northern wilds were abruptly ended, however, when in October, 1892, my father was appointed an Associate Justice of the United States Supreme Court, and it became necessary for me to assume the care of private legal work that he relinquished. I never abandoned my intention to visit that remote wonderland, however, and 19 years later the opportunity came for me to go there to study the big-game animals and some of the strange birds for which Alaska is notable. On this expedition I was to capture permanent trophies of the hunt with the camera rather than with the gun.

Experience had long before shown me that success in the pursuit of wild life does not depend on how far one travels away from home, or on how extensive and primitive the country is. In the virgin forests and the burnt-over, second-growth country immediately north of Lake Huron and Lake Superior, a country now largely deserted by fur traders, Indians, and trappers, one may find a greater variety and abundance of big game in a week, and sometimes in a single day, than one might encounter during an arduous canoe journey

of several months on any of the many open streams leading from the lake country to Hudson Bay.

All these waterways have been traveled for centuries and the large game along their courses has been so reduced that little is seen. Because of the inhospitable winter climate and the lack of proper food conditions and shelter, most of the big game in Ontario, except the caribou, is found on the southern watersheds draining into the Great Lakes.

So it is in Alaska. The reports of miners, trappers, Government explorers, and sportsmen, covering many years of persistent travel and exploration, have shown clearly that the mere distance traversed in this vast country often means little in regard to the numbers of big-game animals observed. Persons often travel a thousand or more miles on the Yukon and some of its tributaries without seeing a single individual of the larger animals.

The caribou is a wandering animal, difficult to find in such a limitless country. In summer the moose frequently remain concealed for months in thickets of alder and willow at the edge of timber line. The bears, besides being largely nocturnal in habits, hide most of the time in the densest jungle or feed high up on the slopes on the tender grasses and wild berries until the coming of the salmon. As for mountain sheep and goats, they habitually occupy the higher ranges beyond the valleys of the larger streams.

MOOSE AND SHEEP THE OBJECTIVE

Of the two big-game animals I sought particularly on my trip in 1911, one, the moose, was to furnish, if I was successful, a valedictory chapter of my many years' observations of this great game animal in the most westerly and northerly of the five districts of its range. The other was the beautiful white sheep of the subarctic mountains, a species with which I had no personal acquaintance, but which I now desired to cultivate in a friendly way.

To stalk, study, and photograph in these remote haunts the largest and most impressive of our antlered animals and then, when this was accomplished, to seek out on



A TRAIN LEAVES SEWARD FOR KENAI LAKE

From these steamship docks at Resurrection Bay the author set out for his Alaskan adventures (see text, opposite page).

the rough mountain summits the snow-white descendants of the latest migrant big-game animal from Asia, constituted a program seemingly sufficient in itself. However, a plentiful stock of sensitive plates was in reserve for any other animals or birds that might be considered worthy of portraiture.

If one obtains satisfactory results from a first and rather hasty exploration of a new and unsettled country, I think it is due as much to the comparatively easy accessibility of the game field as to abundance of the game itself.

THE KENAI PENINSULA—A MINIATURE ALASKA

I selected the Kenai Peninsula, lying between Cook Inlet on the west and Prince William Sound on the east, and within 1,500 miles of Seattle, not only because it was the most accessible territory with an abundance of game, but because in this favored region the moose and mountain sheep reached their highest perfection in physical development and, what was of equal importance, were to be found with certainty in well-defined ranges.

Were all of Alaska blotted from existence except the Kenai Peninsula and its

immediately adjacent waters, there would yet remain a tract that typifies the whole of this wonderful country.

On Kenai Peninsula the remaining few of the original tribal race enjoy nearly all the advantages of modern civilization, yet all about them lies an almost unspoiled wilderness of forests, mountains, glaciers, streams, lakes, and sea.

Here and there snow-capped mountains drop to plateaus, rough and shaggy in coats of moss or yellow-barked willows, and farther down the green coniferous forests border and enclose areas of tundra dotted with glistening ponds, the feeding places for moose and the home of the black fly and the mosquito.

Here in summer occur weeks of brilliant weather and periods of wet and fogs, and here the frequent seismic disturbances show how superficial are the ice fields and the blizzards in a country possessed of great volcanic energy.

Here occurs a midyear season when the calendar days are separated by only an hour of twilight, and another when for weeks the trapper in his sheltered winter cabin cannot see the sluggard sun above the horizon of the surrounding mountains. Here are the tidal waves and ripraps of



AT THE HEAD OF RESURRECTION BAY LIES THE TOWN OF SEWARD

The cross to the north indicates the position of Upper Kenai Lake. Forty miles to the westward was the hunting ground of the author.

Turnagain Arm, similar to those of the Bay of Fundy, and here so rare is the atmosphere that at times Mount McKinley, distant 200 miles to the north, can be seen from the higher mountain tops.

Almost at the last moment of preparation for my trip I was obliged to get a substitute for my old Michigan guide, John Hammer, who for 25 years had accompanied me on such excursions. Sickness in his family kept him at home. Charles Anderson, another tried employee, who possessed a fair knowledge of the woods and waters, took his place.

On July 8 we left Seattle for Seward, and had pleasant weather throughout most of the voyage. Toward sunset on the evening of July 14 the steamer entered Resurrection Bay, which penetrates deeply into the Kenai Peninsula and forms the most wonderful harbor on the whole Alaskan coast. It is open throughout the winter, when the Great Lakes and connecting rivers are closed for many months.

After a run of 10 miles between two snow-covered ranges that paralleled the bay, we reached the town of Seward. First to respond to the shrill and echoing whistle of our boat were a hundred or more dogs of every breed and color, which amicably

ranged themselves in several compact rows along the edge of the dock, each hoping that some of the garbage saved by the kindly steward would fall to his lot (see page 361).

On their home grounds or street fronts these shaggy beasts maintained a deadline against all canine intruders, but at the wharf there was no distinction based upon race, size, sex, or relationship. Whenever a steamer whistled at night, or any unusual noise aroused them, they would voice wolf-like howls in rising and falling chorus that told plainly of their near kinship to the gaunt and ravenous creatures of the wilds.

TRANSPORTATION ARRANGED

On disembarking, we were met by an obliging innkeeper and soon were in earnest confab with our local guide, Thomas B. Towle, who had just come in from his mining camp on the Upper Kenai River. His launch, he said, would meet us at Kenai Lake two days later, on the arrival of the motor train.

So varied and reasonable in price were camping supplies at Seward that little need be brought in from the outside. The courteous and reliable character of the inhabitants, private and official, made the entry



SEEN FROM THE CAMP, SKILAK LAKE WAS LOVELY

and return to this little town a source of pleasure and kindly recollection.

On the morning of July 17 we boarded a gasoline car of the Alaskan Northern Railroad, en route to the Upper Kenai Lake, 23 miles to the north. The canoe and the bulk of the provisions were to be forwarded by freight several days later. The railroad extended to the end of Turnagain Arm, halfway to the Matanuska coal fields; but because of the lack of sufficient capital and the withdrawal of the coal lands it was in financial straits. It was a most convenient highway for hunters and miners, however, and if anyone lacked cash to pay the fare of 20 cents a mile, or was of an economical turn of mind, the road bed afforded a fine trail to the interior.

ON TO THE GAME COUNTRY

The car stopped close to the lake shore, and it took but a few minutes to transfer our baggage to a comfortable launch. Soon we were traversing a part of the longest watercourse of the peninsula, which from the head of Snow River to Cook Inlet is 117 miles. The Upper Kenai Lake is 23 miles long. It has a maximum width of 1.5 miles, and is 460 feet above sea level. The Upper Kenai River, its outlet, is 16 miles long. The lower lake, usually called Skilak, is 15 miles long, four or five miles wide, and 150 feet above the sea, and its waters reach Cook Inlet after a tortuous run of 53 miles.

At the outlet of Upper Kenai Lake we transferred the outfit to Tom's big flat-bottom skiff, and, dropping down the river several miles, went into camp at the mouth of Cooper Creek to await the arrival of the canoe and provisions. The maximum temperature was 80 degrees at noon. The next day it rose to 87 degrees, a most unusual record.

A GOOD WEATHER GUESS

Seeing that the half-embedded boulders were sweating vigorously along the river trail, I predicted a big thunderstorm, and elicited the information that such storms were very rare in this region. Soon, however, the rain came down in torrents and thunder echoed for hours throughout the valley. Thus I gained that distinction which comes when one makes a lucky hit. The storm proved to be the only heavy rain of the entire trip. Thereafter clear days and a high temperature surprised and pleased us all.

As usual on expeditions when supplies can be carried by water, my outfit was varied and heavy. It is the height of bad management, when one is visiting a remote and unsettled country, to economize in money, time, or labor at the expense of a proper equipment or an ample supply of provisions, provided it is practicable to transport the outfit reasonably. We devoted several hours to the loading of the boat and



WINTER SLEDGE DOGS LOITERED AROUND THE STEWARD'S PANTRY

canoe, putting in each an outfit complete enough to fill temporary needs if either craft capsized on the run to the lower lake.

The clear, warm weather had melted from the mountain range an unusual amount of the last winter's snow and caused the river to overflow its banks. The rapid current that had balked upstream traffic for weeks made it possible to cover the 16 miles down to the lake in a few hours. The hot weather continued until the first week in September, and on our return trip we toiled for four days on the tracking line to bring up the skiff.

The canoe we had abandoned in order that the three men might devote all their energies to the navigation of the larger boat. Even at that late date we were the first to get up the river, a feat that was due to Tom's skill and the energy of all.

STERN FIRST DOWN THE KENAI RIVER

On the short trip downstream from the outlet of the upper lake to our first camp at the junction of Cooper Creek and the Kenai River, I found that it was the invariable practice for all boats, big or little, to go down this stream stern first. To me this was a new method of navigating.

Heretofore I had boated bow first on many such northern streams, originally in the frail and buoyant birch-bark canoe, then in dugouts, and, later, in modern

canvas-covered cedar canoes or those of the knock-down type. Occasionally I had used the big, strong, sharp-pointed bateaux of the Hudson Bay and Newfoundland kind, which could plunge with impunity into the roughest water or, if sufficiently manned, could be lined up any stream, irrespective of inshore rocks and snags.

To load down a small, frail, flat-bottom, square-stern skiff with 1,000 pounds of outfit and two occupants, and then start down the river wrong end foremost, where every 100 yards or so the combers in the narrow channels or the cross currents throw the waves a foot or two higher than the stern of the boat, seemed to be inviting catastrophe. My misgivings were lessened, however, by the knowledge that Tom had the reputation of being the most capable and experienced riverman in the Kenai Valley.

The others expressed grave concern, however, over the safety of our canoe; and thus the feeling of distrust was mutual. Tom said he would rather take his chances on a sawlog, "because it never took in water, and the part above the surface was always the top, no matter how often it rolled over." Here was a chance to compare the efficiency and safety of the two boats running virtually side by side.

The explanation for Tom's method of handling a skiff soon became plain. No ordinary boat can safely run a swift and



BREEDING ROOKERY OF THE BLACK CORMORANT

There were two rocky islets near the eastern end of Skilak Lake, this one occupied by cormorants exclusively, and the other by gulls and terns. Note that the cormorants, unlike the gulls, on skyline or rock background, are not protected by their coloration.

It was in this territory represented by this map that he photographed the white sheep of the Kenai Peninsula and discovered the new species of bear later named *Ursus shirasi*.



NESTS OF CORMORANTS TOPPED A PINNACLE OF THE ISLAND

On the mainland mountain in the background are the snowfields close to the shore of Skilak Lake.

tumultuous stream when floating at the same speed as the current. It must go either faster or slower, in order to respond readily to the rudder or paddle when one is steering. In a canoe the occupants, of course, face ahead. By letting the skiff run down stern first the oarsman and the steersman also faced down the river, the advantages of which I learned later.

SERVING AS COXSWAIN

Since the river was unknown to my Michigan guide, who was to manage the canoe, it was arranged that I should sit in the stern of the skiff, facing upstream, with the canoe keeping 50 yards or more in the rear, so that I could note the character of the water at each bend, and by signals tell the guide which side the canoe should take.

The first proof that the different methods of navigation were based upon the character of the boats came a few minutes after we started. On rounding a bend, we found in the middle of the stream, less than 30 yards away, an immense rock, over which the water was breaking with great force and

against which we threatened to drift broadside, as the current divided. Tom pulled vigorously to the left, quartering upstream, and, although he could not quite stem the current, the boat slowly worked inshore, with a good margin to spare when we dropped past the rock.

Had the boat been going faster than the current, with the oarsman's back to the danger, a smash-up would have been certain. Charlie, on the other hand, in the light and more easily handled canoe, took the inshore channel with a few strokes of his paddle. Thus the lighter boat depended on speed and ease of propulsion, whereas the clumsy and heavily laden skiff, with Tom facing downstream, could be kept in the middle of the river or pulled to either side in time to avoid rocks or rough water.

I must concede that there were times when the skiff thus handled had the advantage over the canoe, for when we entered certain rapids, where the breakers extended from bank to bank, we could by pulling at the oars slightly check the descent. The great curling waves would fall



THESE FEATHERLESS CORMORANTS ARE ABOUT EIGHT DAYS OLD
Their smooth and shiny backs and blunt heads make them resemble turtles in the nest.



HOW THE SAME TWO CORMORANTS LOOKED ONE MONTH LATER
They have acquired plumage to cover their shiny backs of their babyhood and are beginning to take notice of their surroundings.



THESE THREE CORMORANTS ARE TEN DAYS OLDER THAN THE TWO ON PAGE 365

Unlike gulls of a much younger age, they do not leave the nest when alarmed, but groan and disgorge the contents of their stomachs. The cormorants in this picture disgorged two quarts of fish from their pouches when the author appeared to photograph them.

away harmlessly from the flat stern, because they were receding with the same speed as the current. At such times the canoe, drifting rapidly with the stream and often going much faster in order to keep its course, would be deluged with spray, and occasionally a wave would overlap the bow.

To those who have occasion to run swift and crooked streams in backwoods craft that is likely to be one of the easily constructed, box-timbered kind, the stern-first method can be highly recommended as safe and comfortable. Had such a method been in vogue in early gold-rush days on other Alaskan rivers, many a valuable cargo and many a miner's life would undoubtedly have been saved.

At a box canyon, about three miles above the lake, through which the river runs like a mill race between high and perpendicular cliffs for nearly a quarter of a mile, we portaged the canoe and our more valuable

things, since I was unwilling that any risk should be taken. A week before a large boatload of government supplies had been nearly lost here. Half filled with water, it had floated helplessly down the stream.

MOOSE SIGNS UNMISTAKABLE

While we were making this portage, it became apparent to us that we had reached the first great fall and winter range of the moose, for the numerous and well-worn runways, the trees denuded of their bark and lower branches, and an occasional shed antler told the story.

At the foot of the portage we camped for the night near one of the few sloughs connected with the river, in the hope of getting a moose picture or two, but because of the high stage of the water and the fact that the most of these animals were then at the edge of the timber line or in the great swamps west of the river valley, our stop

resulted only in giving the mosquitoes an unexpected but welcome meal.

Soon after we started the next afternoon, the canoe, in making a quick rush to avoid going under a log jam, got ahead of us, and when we overtook it 10 minutes later, we found Charlie clinging to a bush with one hand and bailing out with the other. The mishap was

due to his having kept to the middle of the stream when rounding a sharp bend. He had run into a stretch of what the natives call "smoky water."

His misadventure might have been avoided had we been in advance or had he known the river better. When asked about the matter, he cheerfully remarked that it was now plain why Tom had given him all the canned goods—"because they were waterproof."

At length the boats came to the first slack water, and the next turn revealed the lake, higher by several feet than usual at this season, but smooth and glowing in the quiet hour preceding sunset. For the first time the oars and paddles became necessary for locomotion and, relieved from the continuous strain of watching for rocks, log jams, rough water, and tumultuous whirlpools, we enjoyed the placid surroundings to the utmost.

Dividing the mouth of the river was a low, sandy island ablaze with a solid body of crimson flowers. A semicircular stretch of shore formed by a yellow ribbon of sand was backed by a green fringe of spruce. Still farther back on each side towering snow-capped mountains extended halfway down the lake. Beyond these, rounded hills sank into a great flat that extended to Cook Inlet on the west and to Turnagain Arm on the north.

A wide valley on the left, with a muddy floor resembling a former river course, Tom said was the outwash plain of a great



IT REQUIRED A SKYLINE PHOTOGRAPH TO SHOW THEM

Young gulls' coloring harmonized closely with the rocks and gray brush.

glacier that began a few miles back and extended, he thought, 65 miles to the southwest.

His statement immediately aroused my interest, and during the succeeding days I learned much about the great ice field from which the Skilak glacier flowed. On my return to Seward, and later to Washington, I was able by dint of much inquiry to learn something of its history, with the view of ascertaining in a general way its origin and its probable status among the great ice fields of the northern continent.

THE GATEWAY OF SHEEP COUNTRY

We continued down the lake, and Tom pointed out what he called a "low divide" in the southern range, saying it was the gateway to the sheep country, 10 miles or so in the interior. In the setting sun the distant patches of alders and matted forests looked like smooth greenswards on gently sloping sides.

The climb appeared easy—an impression, however, that was changed considerably when we came to struggle for 3,000 feet up the precipitous sides, where our feet became imprisoned among gnarled limbs and the packs were continually catching in the stiff and unbreakable branches of the dwarf evergreen thickets.

On reaching the lake, we had studied its general contour, and estimated the distance to our first permanent camping site to be some 10 miles to the southwest. My desire to remain for one night at the upper end



ARCTIC TERN ENJOYED A RIDE ON A DEAD LIMB

The birds were loath to leave their floating perch in the center of Skilak Lake even when they were photographed at six feet.



THE KITCHEN AND DINING TENT AT SKILAK LAKE WAS OPEN

With ideal weather and surroundings to charm the eye of the nature lover, camp life was most enjoyable.



OTTERS SEEK SALMON IN A BAY OF SKILAK LAKE

They swim with heads high out of the water and bodies submerged. Thus they can see leaping fish.

of this fine body of water was strengthened by observing two rocky islets ahead, over which gulls, terns, and cormorants were flying in considerable numbers. As we passed these, we saw many nests. In a few minutes the boats were beached in a sheltered bay just opposite the islands.

Here we collected our first wild onions, which we found growing in the shallow waters. Erecting a single tent on the sandy shore, in order to escape a horde of mosquitoes that were buzzing in the forest, we passed a night rather uncomfortable, and noisy with the shrill cries of the gulls and the weird grunts and groans of the black cormorants. Soon after sunrise we visited the bird islands under escort of a great flock of protesting parents.

While the gulls and terns continued to circle just overhead, the cormorants flew

short distances on heavy wings, and dropped into the lake to watch with anxiety our visit to their nursery. Some of the scenes are recorded in the accompanying pictures, with explanatory legends.

THE GIANT MOOSE OF THE KENAI PENINSULA

Continuing along the high and rocky northern shore for about seven miles, and finding the direction of the wind to be favorable, though a considerable sea was running, we crossed the lake, where it was about four miles wide, to a beautiful little beach flanked by an open grove of spruces. This site we selected for a two weeks' camp. It was at the end of the longest and most sheltered bay on the lake (see page 360).

The distance across the base of the promontory to the west being less than 75 yards,

the canoe could be carried over and launched in the next bay. During the remainder of the stay we had boats in adjoining bays and thus saved considerable time by using either boat in accordance with the direction we wished to take. By this arrangement we were always able to take advantage of a lee shore, an important feature in a country where furious gales that are seldom forecast by the barometer, suddenly spring up in response to local conditions. For purposes of future identification, we called this Double-bay camp.

The erection of the tents, the manufacture of camp furniture, and the setting up of the light sheet-iron Klondike stove took the remainder of the day. Toward evening I ventured back into the forest to look for signs of a moose, for we were now in the home of *Alces gigas*, and several large runways on either side of the tents showed that we were trespassing upon one of its main thoroughfares around the lake. No fresh signs of any kind were in evidence.

At dusk, however, the guides saw, from a nearby knoll, five moose wading in the shallow waters of a pond a mile and a half distant. This sight went far to sustain the accuracy of the information upon which our camp had been located.

Selection of a good game country does not of itself guarantee individual success, though it is, of course, the most important element. Each individual of all our larger wild animals has a particular range often covering an extensive region. Within these ranges they quite often change more or less systematically, according to the season, or arbitrarily, according to the conditions of the weather and the food supply.

BOTH MOOSE AND SHEEP NEAR

If my advance information were correct—and it came from several sources—it meant that I should find moose in an area of less than a square mile, and at a period of the year when they were hardest to locate. The white sheep were to be looked for in several converging ranges, all under easy scrutiny from a single point of observation.

In all my journeys to the wilderness home of hoofed animals, I have only occasionally found an extensive region without animal licks, those resorts where the mineralized waters or soil attract ruminant quadrupeds. True, many of these spots are unknown to the hunters, even those familiar with the locality; nevertheless some hunter or ex-

plorer frequently knows of such a place. And here the game photographer should locate for a while, without any fear of the criticism that every true sportsman would voice at the destructive custom of killing visiting animals at a lick, be it natural or artificial (see Volume I, Chapter XII).

An Eastern sportsman had informed me that a mile or so west of the present camp there was a good-sized lick and, from the signs about it, he judged that a number of moose visited it, even in the summer time. Since Tom had been his guide, I knew there would be no trouble finding it. I had also heard of a large lick near the south shore of the lake.

FIRST SIGHT OF GIANT ALASKA MOOSE

What happened the following day is described in extracts from my notebook:

"July 24, 1911—*Thermometer*, 68-50.

"At 9 a. m., in a bright sun and a dead calm, we started to look for the moose lick near the shore, and situated, according to directions, at the westerly base of a long point, which I took to be the one heading toward the lower end of Caribou Island. In half an hour the canoe entered the channel between the island and the point, and in a few minutes we swung around toward the bight of the bay. Tom said that the previous winter, while he was crossing the lake with a dog-sled carrying provisions from Cook Inlet to a mining camp, he had run 14 moose, principally bulls, off Caribou Island, but he did not think we would see any bulls at this season, since they were all hiding in the thickets well up toward the mountain-tops.

"A moment later he whispered, 'Gee! there's a bull, and a big one, too!' What I had taken for the brown soil on the roots of an overturned tree was a large moose with antlers that merited attention, but no more than did the tawny color of its coat. I had never seen such antlers before, nor such a color. The moose was quietly watching the canoe, with the greater portion of his antlers shoved up into the lower branches of a spruce. After examining him carefully through a powerful field-glass, I was about to prepare for a picture when Tom, who had been gazing about, said, 'Gee! Two more bulls! Look to the left.'

"There, coming in line toward us, were two big brown-coated beasts with antlers which would have tickled a Maine hunter, but which were somewhat smaller than



A FAIR-SIZED BULL COMES TO THE EDGE OF THE LICK

Note the long, remarkable "bell," which dangles for 18 inches from its neck and looks exactly like a broken halter end, swinging freely as the animal walked.

those of the first one seen. I got the camera ready for the pair.

"The bulls turned toward the bigger one and for a moment or two rubbed noses in a friendly way. It was the climax of my opportunity, but I missed it by overcaution. The pair passed to the rear and soon were out of sight. They had doubtless been disturbed by us farther down the shore. The big fellow, however, motionless as an image, still gazed at the three heads peering over the edge of the grass."

"No other animal is more obtuse and stolid than the moose appear at times, and no other animal, when he is finally alarmed,

is a more helpless victim of an increasing and progressing fear. At times it seems almost impossible to alarm one, but once the alarm is accomplished, one wonders if the moose will ever recover from the shock.

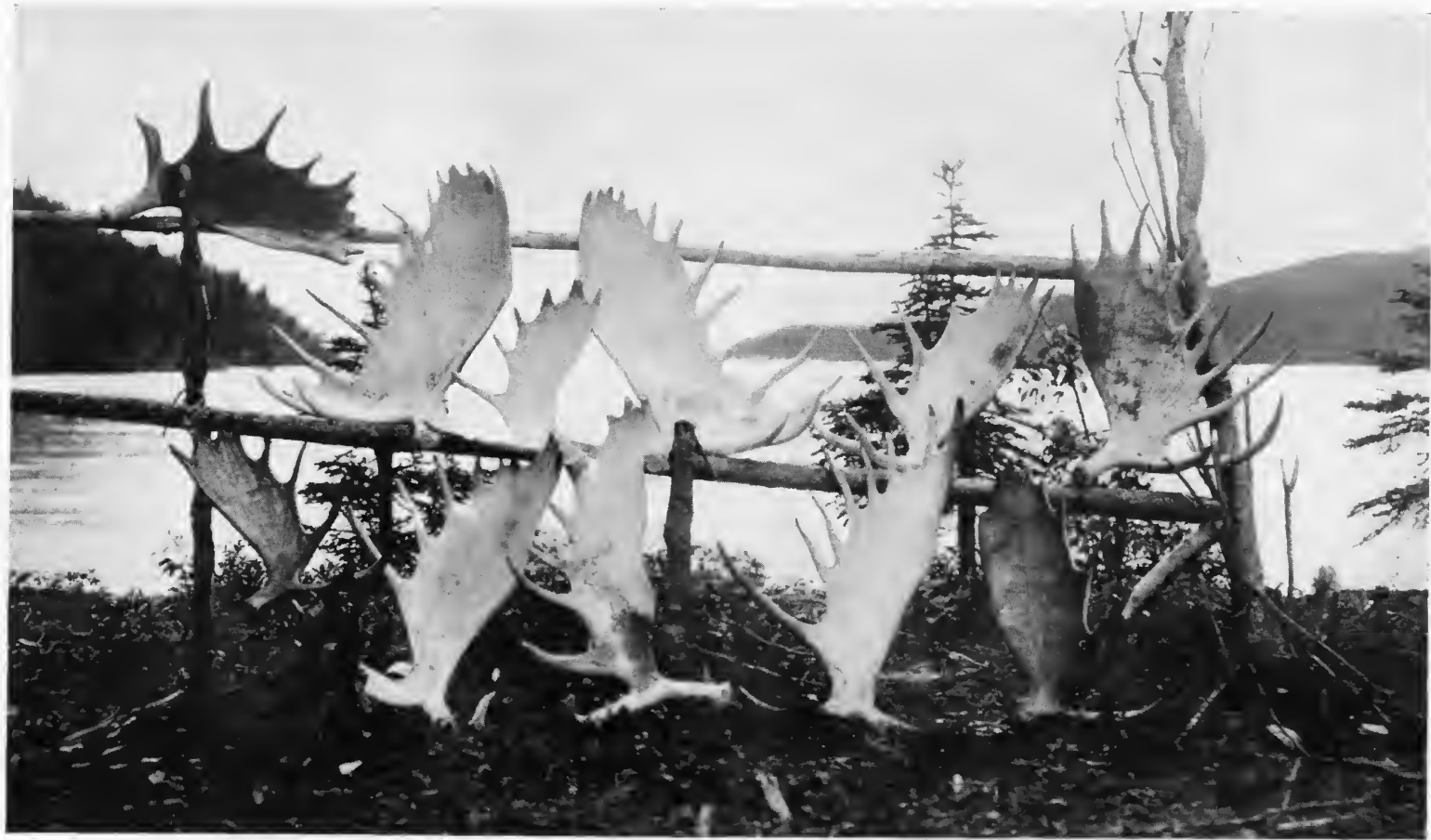
"Getting out of the canoe, I counted on taking a picture of the big bull as he swung clear of the tree. Walking slowly, I got within 50 feet, when he backed a few yards and then peered under the branches from the other side. After taking a picture in this unsatisfactory position, I again advanced, but he slowly turned about and walked away with the spruce intervening.

"Somewhat disappointed, I returned to



THE MOOSE LICK OF SKILAK LAKE WAS HARD TO FIND

The impregnated soil had been eaten several feet below the surrounding marsh, exposing rocks and uncovering many small mineral springs. The view shows the lower half of the lick, looking toward and across the western end of the lake (see text, page 377).



THESE OFFER A NEW SPORT FOR OLD SPORTSMEN

In the picture are some of the finest moose antlers found in the ten days at Double Bay camp. The collection was added to later (see text, page 386).



THE AUTHOR WENT A LITTLE CLOSER

When the cow moose turned toward him, the camera recorded a second picture of her (see text, page 380).

the water, and was about to step into the canoe when I noticed that the bull was coming back. In a minute he was gazing once more at me through the branches of the spruce. Since it was now time for his noon-day rest, and since he evidently was determined to see the thing out in a comfortable way, he unconcernedly lay down. For the first time I was able to see, in all their symmetry, the great antlers just above the top of the high grass.

"This led to a change in my plans, and, detaching the smaller and faster lens, I got out a big telephoto to obtain, by a slower exposure, a picture of the antlers. Armed in this way, I began a slight advance to where the footing would be firmer. At this the moose got up with considerable energy,

and all I could see on the focusing mirror was his slowly retreating rear—an unattractive target for the camera, however vulnerable it might be to a ball projected by a modern rifle.

THE BIG MOOSE LICK OF SKILAK LAKE

"Thus, in 10 minutes, three big bulls had offered what would have been easy rifle shots to the veriest tyro; but a single picture, worthless beyond its power to recall the scene to mind, was the only result of my first encounter with the giant moose.

"Pleased by the prospect and disappointed somewhat by the retrospect, I began a search for the lick, which I felt sure was not far away.

"A short distance beyond the canoe, in



THE AUTHOR DELIBERATELY SCARED THIS BULL MOOSE

So unsophisticated was the animal that, after a few pictures, it did not fear man. It had to be given a lesson for its own good (see text, page 381).



THIS LARGE COW MOOSE EDUCATED HERSELF (SEE PAGE 380)

She stood broadside, head up, and unquestionably looking at the photographer out of one eye, but to all appearances she was utterly indifferent to his approach until she caught his scent.



THIS YOUNG BULL MOOSE WAS RECKLESS



HE HAD TO BE EDUCATED BY FORCE

One of the author's amusing adventures involved teaching this animal to beware of man (see text, page 381, and illustration, opposite page).



THE AUTHOR THREW A CLUB AT THE YOUNG BULL

The marksmanship was poor, for the stick struck the ground just this side and, one end flying up, hit the animal in the pit of the stomach. This probably had greater effect than a drubbing on the ribs, however much it violated the ethics of striking below the belt, for he jumped up into the air with his back arched like a scared cat.

the corner of the little bay that lay to our left, we found a large mud hole around which the grass had been trampled for some weeks. The roiled condition of the water showed that one or more moose had been there within a few hours. Looking beyond and through a fringe of trees, I could see a big bare area, the surface of which was plainly several feet below the surrounding marsh.

"Familiar with similar conditions elsewhere, I felt certain that this was one of the greatest resorts of its kind I had seen in many years. Moose had either eaten the

removed soil, or swallowed it in the process of guzzling the mineralized water that oozed out here and there and covered a considerable part of the surface (see page 372).

"It was plain, too, on closer inspection, that the long drought had begun to affect the surface flow; for much of the ground was hard and dry. This accounted for the moose opening up a new lick near the lake by tapping the springs at the base of the sloping shore.

"The number of fresh tracks and the variation in their size finally convinced



A COW MOOSE CAME TOWARD THE AUTHOR

While changing plate-holders, he was surprised to see her turn about and approach on a slow trot.

To the uninitiated this would probably have meant a charge (see text, page 380).

Tom that a good many bulls were regular patrons of this watering place. Since the surrounding country had all been burned over many years before, conditions were somewhat unfavorable for daylight photography. Bull moose, unlike the caribou and elk, are largely nocturnal, especially when visiting licks or exposed feeding places. The ones we had just seen were early morning visitors, and the little patch of spruce would have sheltered them until afternoon or evening but for our unexpected arrival.

FEAR BANISHES STOLIDITY

"While talking over the location of the blind in reference to the position of the sun at different hours and the probable direction of the prevailing winds—the two vital elements in this kind of photography—we saw the big bull a mile away, tearing along the top of a bare ridge that led to the mountain forests. His gait showed that stolidity had at last given way to a belated but overpowering fear. We never saw that animal again in the weeks we spent on the lowlands. As we were cutting brush, a good-sized cow moose walked up within a stone's throw and trotted away unmolested.

"Anxious to learn the number and course of the runways, and the character of the country immediately back of the lake before taking up the daily vigil at the blind, we went inshore half a mile to the pond where the moose had been seen the evening before. Here several acres of pond lilies in shallow waters were untouched—not a leaf or root eaten or disturbed—a condition that was in striking contrast to similar places in the moose country of Maine, New Brunswick, central Canada and Minnesota, where such aquatic plants are considered the choicest summer food.

"Going a mile further, Tom recognized a high mound as the lookout for the other lick, which we examined with great care. It had been used to some extent, but appeared to be only a brief stopping place for the moose en route to the shore lick—as indicated by the runways, but more particularly by the condition of the soil."

Whenever the wind was favorable and the weather was clear, I went to the blind at the main lick, but usually between 9 and 4 o'clock the breeze came in from the lake, carrying my scent across the principal runways, so that within a few days a number of moose suspected, though unjustly, that



JIM JEFFRIES WAS IN ALASKA ON A MOOSE HUNT

Near Skilak Lake, on the Kenai, the author met the former world champion heavyweight pugilist (right). He was out with a guide after fresh meat.

a foe was in ambush near the lick. Altogether I saw some 30 moose in the immediate neighborhood.

One big moose came within easy rifle shot, got the scent and retired, and two others, equally big, were at the lick one morning on my arrival, but could not be photographed from the water. All the others, with one exception, were cows or bulls ranging from one to five years of age.

The exception noted was an enormous bull that came down wind on a rarely used runway to the rear of the blind. The first intimation I had of his presence was a loud grunt behind my back just when I was eating lunch one day, and I nearly choked with surprise. In the excitement he got away, leaving me only a mental picture of a frightened moose and a flustered photographer.

I saw no calves, but only the tracks of a few in some of the heavily forested valleys about the lake. Occasionally large moose could be seen a mile or two away feeding in and out of the willows near the summits of the mountains.

The light-brown color, noticed the first day, was the rule in the case of all the other moose, the shade approaching very closely

that of the great brown bear of the inland. Judging from the shreds of the spring-shed hair and that of several abandoned hides near hunting camps, the winter pelage must be a light buff-brown in color. In the extreme southern range most moose are dark-colored in summer, looking almost black at a distance, with a somewhat lighter shading on the legs and flanks.

HAIR WHITE AT ROOTS

Some of the pelts examined show that all the hair of the narrow abdominal strip was glossy black, while that of the side and back had buff-brown tips, with a pure white body to the root. If the darker tips were clipped, the animal would appear to be white from the ventral strip upward.

The giant moose differs mainly from its counterpart in eastern Canada by its larger size and bigger antlers combined with certain skull and color characters. The largest pair of antlers known had a spread of a little more than 78 inches.

When we returned from our trip into the white sheep country, we camped on Caribou Island in the river opposite the big salt lick where we had made our first observa-



THESE ANTLERS, WITH THE SKULL SPREAD OF FIVE AND A HALF FEET

It is impossible to tell whether the animal died of old age or from wounds. The largest antlers recorded from the Kenai Peninsula ranged between 74 and 77 inches in width (see text, page 386).

tions on moose on our way in. From this location we had several encounters with regular patrons of the lick so much out of the ordinary that they are given below.

A COW MOOSE THAT BECAME SELF-
EDUCATED

*"Caribou Island Camp, August 17—
Thermometer, 74-38.*

"Just before noon the wind veered to the south, coming well offshore. Charlie paddled me across the bay to the blind and then went after a mess of partridges.

"I was hardly in ambush before the old cow moose was at a mud hole opposite, drinking a gallon or two of the muddy mixture. So active was the effect upon her salivary glands that long strings of saliva drooled to the ground.

"Determined to try for a close picture and to test her disposition when thus interrupted, I boldly walked into view, crossing

the bare and much-trampled field to within 50 feet. She stood broadside, head up, and unquestionably looking at me out of one eye, but to all appearances utterly indifferent to my approach. I took a picture and went a little closer. She turned away without looking, and again the camera recorded the scene (see page 375).

"While changing plate-holders, I was surprised to see the moose turn about and come toward me at a slow trot. To the uninitiated this would probably have meant a bold charge, and to the nature faker sufficient grounds for an exciting story. The animal was now so close that I could notice her nostrils working convulsively, and could see that if let alone she would pass to my leeward about five feet—the first position in which she could get the scent without coming at me directly.

"Wishing to avoid alarming her so soon, I backed across the field to the edge of the



A FEMALE SPRUCE PARTRIDGE MAKES HERSELF AT HOME

She is sitting on an old hawk's nest. She represents a species common in the wooded parts of the Kenai as well as in other forested sections of Alaska.

marsh, but she still followed. Turning my back to the animal, I walked ahead, and upon reaching a place where the ground was almost impassable with fallen timber, I stopped. By this time I noticed that she had crossed my tracks, and thinking perhaps I was mistaken about her wishing to get the scent, I awaited developments. The cow immediately came up, circled almost within reach, and suddenly caught the scent.

"The effect was instantaneous and remarkable. It is unlikely that this animal had come into range of human beings many times in the wilderness that was her home, yet she recognized the scent. As she realized that man was near, she sank back on her haunches, and I noticed that her shoulders trembled violently, just as if a

rifle ball had penetrated her through and through. With a quick, awkward plunge, she made off at her fastest gait. Thus this innocent and apparently impassive animal suddenly revealed her inherited dread of human scent."

A LITTLE BULL MOOSE THAT WAS FORCIBLY EDUCATED

A few days later there occurred another similar scene in the same locality and with a somewhat amusing sequel:

"August 27—Thermometer, 58-34.

"One of my favorite visitors was a little bull moose. At first he always came in company with a five-year-old, but the latter got too much scent on one occasion and ran off, with the smaller one trailing wonderingly behind. But on this particular occa-



A YELLOW-HAIRED PORCUPINE HAD COME TO GNAW THE SHED ANTLERS

It became necessary finally to suspend these trophies on wires from trees to keep them safe from such thieves as these and the squirrels.

sion he was alone. The way he kept eyeing the blind rather indicated that he had visited it in my absence. He came from the long point, where the flies were scarce, and after filling up nearly to the bursting point on lick water, he lay down unconcernedly in the middle of the lick to take a nap.

"Since this was to be the next to my last day in the blind, I concluded to try some more experiments. As I came out of the blind, he saw me at once, but did not get up—simply turned his ears my way and expressing great astonishment in his big, round eyes. When I got very close, he arose

and walked to the edge of the marsh, where, getting the sun behind me, I took his picture (see page 376). Later I tried to force him down toward the lake where there was a more effective background. This he objected to, but ran about playfully, showing no concern at the scent.

"After taking a few more pictures, I concluded that I would be doing him a very poor service to leave him in this unsophisticated state of mind. It was plain he now no longer feared the sight or scent of man, and would doubtless soon fall a victim to a party of hunters who were camping half a mile down the shore. Selecting a good-sized club, I got as close as possible, an undertaking in which I was helped by grunting like a bull.

THROWING A CLUB AT A MOOSE

"Throwing the missile with all my force at his well-covered ribs, I gave a piercing yell at the same time. The marksmanship was poor, for the stick struck the ground short and one end flying up hit him in the midriff. This probably had greater effect than a drubbing on the ribs, however much the ethics of such an encounter were violated by the blow below the belt.

"He jumped into the air with his back arched like a scared cat. When he came down, there was no doubt about his intention or ability to get out of that part of the country. Before I could pick up the camera he had vaulted over and beyond the fallen timber."

Only when I blew up the huge grizzly bear with a flashlight machine (page 309), have I known an animal that got its education more quickly, and never, as later events proved, to better purpose.

The following day I came to the blind at an early hour, hopeful that one of the big bulls from the hills would come within photographic range. Just what occurred becomes a sequel to the diary entry of the previous day.

"August 28—*thermometer*, 72-38

"From the start the wind was variable and so light that the mosquitoes became annoying for the first time. Twice I saw a cow moose wandering about, but she was wary. As the hours passed, I was satisfied that the little bull had made his valedictory appearance and was not disappointed by the thought.

"Precisely at 2 I heard the sound of a heavy animal running, then a splash down

toward the lake. I could see the little bull struggling out of a mud hole, his feet working like the blades of a water-wheel. Out he got and rushed on without a stop or a glance to the rear. Evidently something was after him—possibly a grizzly bear that looked almost as big as a locomotive.

"Getting out the field glass, I covered what looked like his back tracks for a long distance. I finally noticed the figures of two men coming down the hillside. Since each was armed with a rifle I knew they were not my guides.

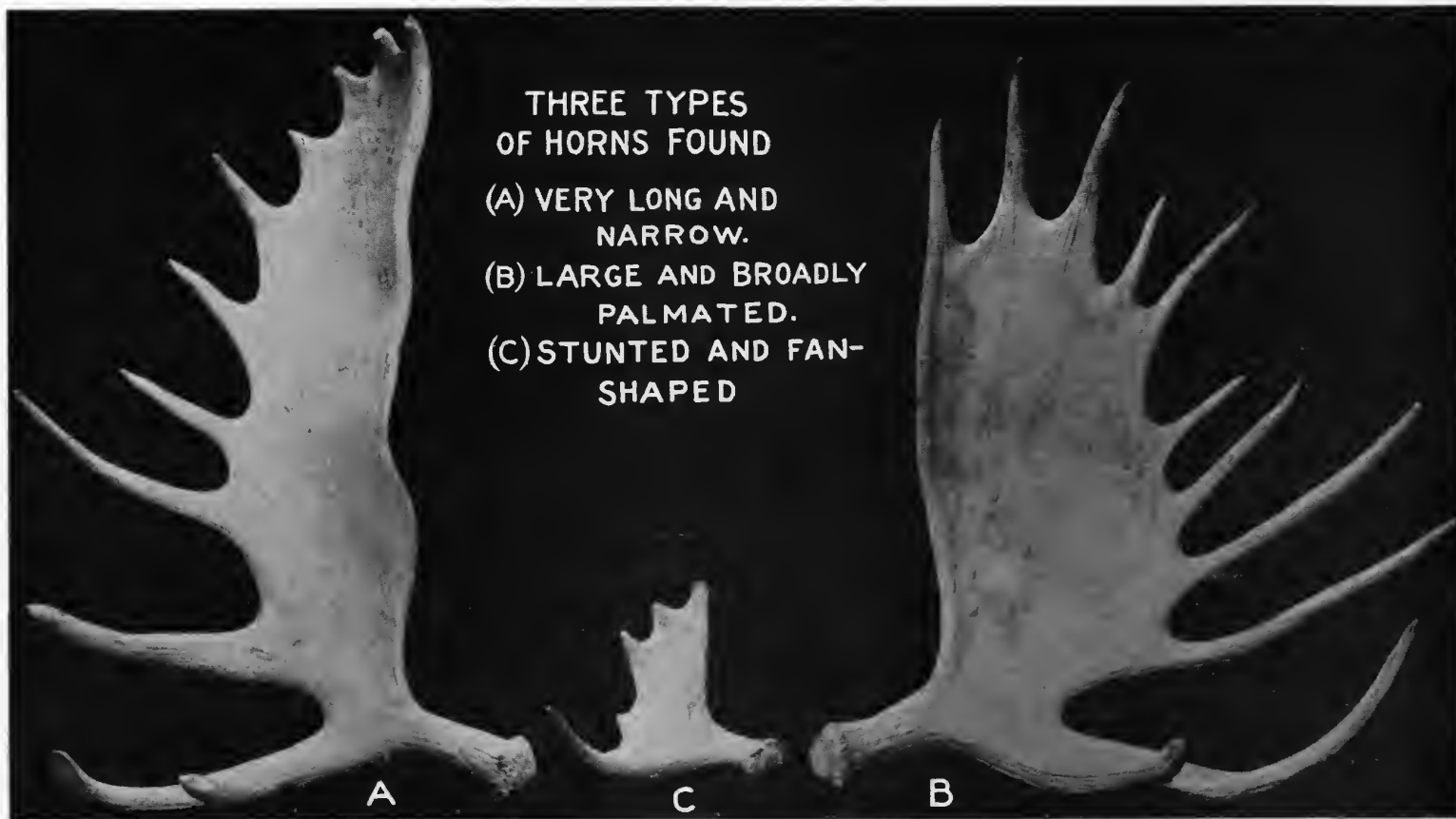
"On their approach I arose, and after a greeting found that the larger and heavier of the two was Jim Jeffries, the ex-heavy-weight champion of the world. He explained in substance that they were out after a supply of fresh and tender meat, preparatory to hunting big bulls for their heads and had seen in a dense cover the flanks of a small moose. To make sure it was not a cow, the killing of which was prohibited by law, they had crept up very close, and made a slight noise to cause the moose to bring his head into view.

"The animal had given a quick glance out of the corner of one eye and run down the hill as if the devil was after him. Not till the moose was beyond favorable rifle shot did the glass disclose to the hunters the small antlers. They were now pursuing it in hope of a shot. The man of muscle trusted that they had not interfered with my getting a photograph of the little bull. Assuming a slight disappointment, I indicated that I was fully rewarded by the opportunity thus presented of getting a photograph of a *homo gigas*, and snapped him instantaneously."

THE LITTLE BULL PROFITED BY HIS BAD SCARE

A month later I heard that the little bull had apparently gone through the hunting season unscathed. This year he is proudly growing a pair of Y-shaped horns, and who knows but what in the course of time he will be seen stalking across the ruddy tundra or standing like a sentinel on a granite ridge wearing a polished and serrated crown, so remarkable in size and symmetry that the *Alces gigas* of the Kenai shall have in him an individual that will represent in the future as in the past the largest of the antlered race since the days of the prehistoric Irish elk.

When a sportsman visits the distant



THESE THREE DIVERGENT TYPES OF ANTLERS WERE FOUND BY THE EXPEDITION

There was a remarkable resemblance between them and those of the Upper Yellowstone River (page 320). Confinement of the moose in a limited area at a high altitude may account for this resemblance, since elsewhere in Alaska the antlers are normal.



THE SPREAD OF THESE ANTLERS DOUBTLESS EXCEEDED SIX FEET

This large pair of symmetrical antlers is noticeable for the absence of any divisional separation of the brow antlers, the palmation being continuous in each antler.



A MALE WILLOW PTARMIGAN ALIGHTS ON A ROCK IN A ROARING STREAM

wilderness and shoots a big bull elk, moose, or caribou, especially in the rutting season, when they are most easily found and killed, it is seldom that any of the rank flesh is used, and the antlers afford the only trophy. The great carcass, weighing from 400 to 1,200 pounds, according to the species, is left for the ravens and the wolves or coyotes to feed upon. Even though such big beasts are killed at a time when the meat is untainted, its toughness or the great distance from civilization means that it is unused.

Between November 1 and March 1 the larger bull caribou, moose, and elk shed their antlers, and in the order of dates suggested. Unlike the white-tailed deer, which usually drop their antlers in January in the dense coniferous forests and swamps, where porcupines, rabbits, red squirrels, and mice soon destroy or disfigure them, the caribou, when feeding in the winter time on the lichens of the wind-swept barrens, the elk in the open parks and rolling hillsides, and the more northerly moose in the willow thickets or second-growth hardwood forests, usually cast their antlers in places harboring fewer forms of rodent life. In such places one may find many fine antlers.

Such as have become bleached from long exposure can be stained to their natural color, and, when mounted on a wooden base, in simulation of the frontal bone, they resemble in all respects the antlers of freshly

killed animals. While it has long been the custom in this country to mount the head and neck, after a lapse of time the shrinking skin, the twisted ears, and the ravages of the moths play havoc with the work of the taxidermist. The old English method of using only the horns and part of the skull has much to recommend it; for many such ancient specimens after centuries of exhibition are superior in appearance to some heads that have been prepared for only a few years.

A NEW SPORT FOR OLD SPORTSMEN

Of course, only the largest and most symmetrical of shed antlers should be mounted, but these will be outstanding in comparison with inferior heads. The network of runways throughout the poplar and birch thickets that were discovered during the several weeks spent in studying the moose near Skilak Lake showed very plainly that this was one of the great winter feeding ranges and that a systematic search would doubtless bring to light many antlers.

In this effort we were successful from the start, and nearly every afternoon one or two especially large or oddly shaped antlers became a part of our canoe cargo. If the camera failed in its quest, here were the discarded crowns of the giant moose, some of them worthy of permanent preservation.

By carefully noting the course of our



A BOAT LOAD OF ANTLERS WAS GATHERED ON THE OPEN MARSHES ON A SINGLE AFTERNOON

rambles, we found that in less than a week we had pretty well covered a square mile. We had brought to view 26 nearly perfect antlers, besides nearly an equal number, found in the bordering spruce forests, which the porcupines had badly gnawed (see pages 382, 384, and 385).

The members of two hunting parties who visited our camp were surprised and pleased at this collection, and could not understand why they had seen only a few worthless antlers in their long journeys afoot. This was because they were usually content to confine their examination of the more open country to watching it from a knoll with the aid of field glasses, or because they failed, when walking about, to detect the prong or two nearly hidden in the soft moss. Further than this, they did not know the meaning of the great white slabs that were visible here and there on many an exposed hillside.

Three distinct types resembling those of the Rocky Mountain animals were found; first, the so-called normal, or broadly palmated kind; second, one of great length and relatively narrow, and, third, a small fan-shaped variety.

The first type was represented by two rather unusual modifications: (a) great thickness of the lower beams with a second set of brow tines beneath, and (b) broadly palmated antler with no so-called brow tines (see illustration, page 384).

In no other range of the moose have I found such a variety except in the mountain valley of the Upper Yellowstone River, and it suggests the possibility that the northern latitudes and segregation affect and vary the antler growth as do the higher altitudes farther south.

I earnestly contend that it is a false pride that leads a sportsman to pass by a beautiful antler not taken by himself and a false standard that always requires that his antler trophies be removed from the heads of animals he himself has killed. To the public, for the use of museums, and in the comparison and differentiation of the types, shed antlers are just as valuable and just as interesting as if they had been taken from a recently killed animal.

NUMBERS OF MOOSE ON KENAI

Photographing wild animals requires all the skill and endurance demanded by the most ardent and experienced sportsman, and the finding of the discarded antlers of a giant moose adds to the photographic hunt both zest and a valuable trophy. Fortunately for this branch of sport, it requires patience, persistence, and a fair knowledge of the animal's habits and range. When the best antlers only are selected, the collection will represent quite as much skill and value as if they had been secured by killing its unfortunate owner.



THIS FEMALE ROCK PTARMIGAN WAS PHOTOGRAPHED AT A DISTANCE OF ONLY FIVE FEET

The hen had two warning notes for the young, one causing them to remain stock still or crouch wherever they happened to be—so faithful was the obedience that one could pick them up—and another which caused them immediately to seek an overhead protection, either beneath the broken rocks or under the rims of snow or ice (see text, page 393).

I have already mentioned the abundance of moose observed by me during my hunt on the Kenai in August, 1911. Since that time many conflicting accounts of conditions there have been spread from year to year, some people even going so far as to assert that this great game animal is in danger of extermination in that area through overkilling by man. As a matter of fact, for years after my visit, moose were more abundant there than in any other area of equal size in the world, and the greatest danger facing them was the starvation that may result from exhaustion of the available winter forage.

While Dr. E. W. Nelson was at Seward the summer of 1920, a local guide guaranteed to show him at least 300 moose in a week, if he would go back into the moose country. During some of the winters following the snow was so deep on the Kenai that the food supply was deeply buried and starvation confronted many of the animals. The hunters and trappers in the region appreciated the situation and cut down many birch trees in order that the moose might feed upon the tops. The animals soon learned the meaning of the sound of the ax, and some of them were so hungry they

would come and wait for the trees to fall, and would rush forward to appease their hunger before the treetop fairly struck the ground.

In February, 1928, Mr. Van Campen Heilnes published in the *Outlook* some interesting facts regarding the numbers of the moose on the Kenai in 1927. He saw 111 moose, including 29 bulls and 82 cows, in one day, and stated that it was not uncommon to see 60 to 70 in a day. The resident Alaska game warden,

Hardy, estimated that at that time the Kenai Peninsula contained from 8,000 to 10,000 moose, and that only about 100 bulls were being killed annually by hunters. In a circumscribed area like the Kenai such an abundance of big game carries with it a distinct menace for its own future. In 1931 it was reported that persistent, year-after-year pursuit of big-antlered animals has reduced their numbers on the Kenai until a really large pair of antlers is now rarely seen.

THE MOOSE IN GENERAL

The moose, largest of the deer kind, is so curiously proportioned and otherwise different from the existing species of deer that it gives the impression of being a survival from ancient geological times when grotesque forms of animal life roamed the earth. At no distant time, comparatively, the moose was practically circumpolar in distribution, occupying the great forested belt so characteristic of northern lands. It still maintains itself in much of this great range from the Scandinavian Peninsula in Europe eastward through northern Siberia and North America to Nova Scotia.

The moose is neither an astute nor an agile

animal compared with some of the deer, and because of the settlement of parts of its haunts it has disappeared from much of its former range. At one time its decreasing numbers in parts of North America appeared to indicate its approaching doom. It once occurred in considerable numbers in the forests of several of the northern United States, but is now restricted to northern Maine, northern Michigan, northern Minnesota, and limited parts of Wyoming, Montana, and Idaho.

Of recent years in Canada and Alaska the future prospects for the moose have greatly improved. The animals have spread westward in Ontario to occupy the entire northern shore of Lake Superior and northward in Canada to within the watershed of the southern Hudson Bay region and to the Delta of the Mackenzie River, within the Arctic Circle. In Alaska they are continuing to occupy new areas. A part of this extension of range, especially in the Lake Superior region, may be due, in part at least, to the second growth forest on vast cut-over areas which has provided an abundance of browse where little was to be found previously. These factors, with adequate laws, should insure perpetuation of these animals.



A FEMALE AND THREE YOUNG OF THE ROCK PTARMIGAN

The subdued and grayish-brown plumage makes a photograph of the four birds difficult without a background of white.



THE JUNCTION OF THE KENAI AND RUSSIAN RIVERS

The milky, glacial waters of the former commingle with the clear, spring-fed waters of the other.

So far as known, the smallest representatives of the moose with rather insignificant antlers are those of northern Europe. The largest of them all appears to have its headquarters in Alaska. The weight of old bulls in North America ranges from about 900 to more than 1,400 pounds.

To the mountain climber of the north-land there are no other birds more interesting than the ptarmigan. One species, the willow ptarmigan, or willow grouse,



PARENT BIRDS OF WILLOW PTARMIGAN GUARD A RETREAT OF THEIR YOUNG

The birds show remarkable cunning in enticing enemies away from their offspring (see text, page 391).



MALE SALMON WORRY THE FEMALES IN KENAI RIVER

In the upper pair the rear fish is rending the tail of the other; in the lower couple the fish to the right has just bitten a piece out of the dorsal fin of the other. Continuously and relentlessly they struggled in couples, rending and tearing the fins and tails, scoring with their sharp teeth the somewhat smoother sides, and occasionally seizing the nose or lower jaw of their victim. In one pool, separated by shallow water from the others, there were ten salmon, and all in fierce contention.

occupies the tundra and scattered thickets bordering the tree limit. A hardier and more humbly plumed kind, the rock ptarmigan, lives a little higher on the rocky slopes. These birds are so numerous and so tame that they may be readily obtained and can be counted upon to supply the larder with a portable and well-flavored article of food. For several weeks we were in their midst, and when making daily rounds to the glassy plateau, where the sheep were apt to be found, I spent a good deal of time following up the smaller streams in order to study and photograph the birds in their natural surroundings.

Familiar with many other species of grouse, I was particularly impressed by one characteristic of the cock willow ptarmigan. The bird differed from male grouse of the species of the forest and prairie in that he almost invariably accompanied the female during the entire breeding season and, moreover, was the more aggressive parent of the two in times of peril.

WILLOW PTARMIGANS CLEVERLY PROTECT THEIR YOUNG

One's proximity to the family was usually foretold by the sudden fluttering out of the cock, which, with a limp and trailing wing, employed the usual devices of most ground-breeding birds in the effort to coax into futile pursuit any known or suspected enemy. If successful in leading the foe away from the spot where the young crouched by the side of their silent mother, the cock would take wing, uttering loud and raucous notes, to find concealment in a nearby thicket.

If an interloper persisted in trying to locate the young, the female would renew the effort to distract attention. If this did not succeed, she would utter a peculiar note as a signal for the male to return. Between the two of them further efforts would be made to guard against the discovery or injury of the young birds.

In a hundred or more observations we found that the cock was absent only half a dozen times, which might be accounted for by his having met an untimely death in defense of his family or by a temporary absence in search of food.



PTARMIGAN YOUNG IMITATE THEIR MOTHER

She stands erect and the little ones instinctively follow her lead.

Two instances of this strategic cooperation of the parents may be quoted from my notebook:

"Following the creek bottom for nearly a mile, we found the ptarmigan unusually abundant, for the day was warm and quiet and the birds were sunning themselves on the gravel bars or dusting their feathers in basins hollowed out in the sloping banks. One brilliantly colored cock rushed out at us from a patch of dried grass, and I followed him down the stream for a few rods with the camera in hand. His gait, however, increased until he took wing, and I returned to the spot where the rest of the family were doubtless concealed. I could see the hen faintly outlined in the thin grass, but overlooked the five or six young, almost at my feet, until the mother bird took flight and they, too, popped up into the air. On their short wings they managed to fly out of the creek bottom and tumble into a willow thicket a few yards away.

A LUCKY SNAP SHOT

"Going to the lower end, I had one of the guides walk through the willows; but before the family were driven out the cock returned in response to the call of the hen. I finally took a picture of him standing boldly on a rock in midstream. The parents then led the young into a bed of blue flowering peas, and when the two returned to guard the retreat I got a portrait of them (see pictures, pages 386 and 390).

"While sitting in a spruce blind waiting for moose, I noticed a large hawk circling the marsh in search of prey. As it passed behind me, there was a roar of wings, and,



Photo by Beverly B. Dobbs, of Nome

THIS MOUNTED GROUP OF WILLOW AND ROCK PTARMIGAN SHOWS THE WINTER (WHITE) AND SUMMER (DARK) PLUMAGE, WITH THE INTERMEDIATE SPRING AND FALL DRESS

turning, I saw a brood of willow grouse in the air with the hawk poised above them, apparently uncertain which victim to swoop down upon.

"Before this was determined, the cock shot up straight as an arrow in front of the hawk, and the race was on. For the first 50 yards the two were separated by only a few feet, but the way the cock suddenly increased its speed showed very plainly that its flight had been under check until the hawk was lured away far enough to give the surprised family a chance to find some sort of concealment.

HAWK DEFEATED IN BATTLE

"In a minute or so the hawk returned and carefully circled over the hummocks of moss, looking intently for the slightest trace of one of the covey. Down it suddenly dropped for a distance of 20 feet, undoubtedly seeing the brown feathers of a partly concealed bird. With equal speed the hen darted up and apparently hit the body of the hawk just below the tail.

"Either because the talons could not clutch tight in such a position, or because the hawk was unable to strike with accuracy, the daring mother escaped, with the enemy in fierce pursuit. By flying slowly, she enticed the hawk some 50 yards away, then dropped like a plummet into a bunch of alders. The hawk perched himself on a nearby limb to plan anew how to obtain his breakfast.

"The defeated aviator, however efficient its mathematical processes, knew that two from eight left a substantial remainder, and once more he took wing and returned for a survey of the tangled moss. This time I met him with a shout and a waving hat from the spruce blind; and, much disgruntled, he soared away, doubtless wondering at the intervention of a third party."

On the Kenai Peninsula the timber line is at an altitude of about 2,000 feet, and only twice did we notice willow ptarmigans below it, where they were feeding in an open glade upon the earlier ripening swamp huckleberries. The usual abodes of this bird are the tablelands along upland streams terminating in ravines, where the willows and small bushes succeed the limit of arboreal growth.

The rock ptarmigan stays on the treeless slopes above the main range of the willow ptarmigan, while a third species, the white-tailed ptarmigan, lives in the rocks, where

the lichens and patches of grass denote the approaching limit of all vegetation. On the other hand, the spruce partridge remains well within the forested area and is usually to be found in river bottoms or in the second-growth, burnt-over portions of the lowlands.

Thus these four species of northern grouse, whose ranges are complementary, are largely if not wholly controlled by the distribution of plant life, which in turn is dependent on climatic conditions mainly determined by altitude.

One afternoon I saw a small and apparently young red fox coming rapidly down a rock slide, evidently trailing something, but not seeing his quarry. With a field glass I could make out a brood of rock ptarmigan scurrying ahead. When the birds reached the bank of a small ravine, filled nearly to the surface with snow, the hen flew up about 10 feet to alight on the snow, and the little ones with an effort did likewise. Thus concealed from the immediate sight of the fox, they ran a short distance and squatted, where they were practically invisible from their close resemblance to the detached rocks and soil that dotted the edges of the snow.

When the fox reached the bank, he looked intently about and, seeing nothing, descended, sniffing along the surface of the snow below where the birds had alighted. Evidently thinking that they had flown across or had gone farther down, he climbed up the opposite bank. Here a large fat marmot, extracting a root only a short distance away, attracted his attention, and although the fox and the marmot were about the same size, the sudden flight of the latter invited pursuit, which ended unsuccessfully for the fox a few yards away, at the opening of the marmot's burrow.

THE MOTHER ROCK PTARMIGAN HAS TWO WARNING NOTES.

We passed so little time on the mountain summits that I had little chance to observe the habits of the rock ptarmigan and practically none to investigate those of the white-tailed species. In no case that I observed did the cock accompany the brood, and the birds seemed to have no fear whatever of the larger forms of animal life. The hen had two warning notes for the young, one causing them to remain stock still or crouch wherever they happened to be—and so faithful was the obedience that I could



THE IMPRISONED SALMON OF THE UPPER KENAI

This is a gaunt, fierce male, the under portion of the body deep red and that above the surface of the water a dirty and festering yellow.

pick the young up—and another causing the young immediately to seek protection from overhead, either beneath the broken rocks or under the rims of snow or ice.

Once I saw seven small ptarmigan run beneath the edge of a block of ice, where all I could see of them was the projecting

row of small black bills. In another case the young bird, alarmed by the mother's note, squeezed in between my shoes and remained there until relieved by a reassuring call. Hawks and foxes are the principal enemies, while moose, caribou, sheep, or man seem to be regarded in the light of friends.



CHAPTER XVII

Photographing the White Sheep of the Kenai

AFTER obtaining a fairly satisfactory series of photographs of the big moose of the Kenai, I turned my attention to the Alaska white sheep, which had been one of the two main objects of this expedition. While getting information preparatory to my Alaskan trip, I had been struck by the scarcity of photographs representing these sheep.

Since hundreds of the most experienced sportsmen from nearly all countries had pursued these animals, I had considerable doubt of my photographic success among them, even though I had a marked advantage in possessing a better equipment and in making photography my main object. With the others photography had been largely incidental.

STUDY PRECEDES PHOTOGRAPHY

I decided to locate and study the animals first in order to obtain information about their habits, and then, if possible, to make use of the knowledge thus acquired to get within photographing range. If I should at once begin harassing the sheep with the camera at close range, I might get neither pictures nor information.

Ten days were passed in the mountains, four of which were required in going and coming. The six days that I devoted to sheep, with incidental attention to ptarmigan, resulted in a fair collection of pictures. I think the result fully justified the program laid out in advance.

Several days before we started for the interior my old Michigan guide, John Hammer, joined us. The call of the North was irresistible to his Norwegian blood. The addition of a fourth man just as we were about to undertake the hardest part of the journey proved fortunate, especially since the swift waters of the Kenai River had to be overcome on our return to Seward.

At 6 o'clock on the morning of August 5 we were ready to leave Double Bay camp for a 10-days' trip to the sheep country. Tom and John in the heavy skiff and Charlie and I in the canoe made a start for the southeast corner of the lake, just opposite the bird islands. The weather was bright, and the barometer predicted a continuation of fine weather.

On rounding a point, we saw in the morning light the black and frowning features of volcanic Redoubt, and Iliamna's snowy peaks, 100 miles distant on the other side of Cook Inlet. We reached our immediate destination, Cottonwood Creek, in less than two hours, and, after placing our surplus outfit on a porcupine and bear-proof platform, made by Tom the previous season, we started up the mountain creek.

This stream originates in a big snow field just beyond the divide, over which we had to pass on our way to Benjamin Creek, and the cabin in which Tom had lived during a long and vain search for gold. Though Tom found no valuable metals, his effort is commemorated by the creek's being called after the name of his eldest brother.

The ascent was difficult, for the day was hot, the underbrush was a nuisance, and the packs were heavy. Gradually I shed all extra clothing and then lightened my pack, the guides good naturedly picking up the discards as they fell by the wayside. At noon we reached the tree limit half a mile from the divide. There on a rounded knoll where there was plenty of stunted spruce for firewood, we pitched a small tent in which I was to spend the night while the three men returned to the lake to bring up another load in the morning (see page 396).

A LAND OF MOUNTAINS AND RIVERS

After their departure I lay on a cushion of moss for several hours and viewed the landscape through the field glasses, gazing now into the valleys, now upon the foothills and peaks, and now down upon Skilak Lake and across the great untrodden tundra, with its many glistening ponds—the summer nursery of the moose. Most interesting in all this limitless stretch of scenery was Cook Inlet, looking like a giant river and banked on the northern side by the mountains of the Alaska Range, the great cordillera of the Territory, with Mount McKinley as the keystone.

Later my interest became centered in the animals and birds which, in the shadows of the declining sun, came out of thickets of evergreen and willow. At one time I could see a dozen black-haired porcupines, a geographic race of the animal common in east-



THE MOUNTAIN SLOPES ARE STEEP IN THE SHEEP COUNTRY

"Big Pond camp" in the foreground was situated midway between the cabin on Benjamin Creek on the west and the great ice cap on the east. The author camped alone here several nights while photographing white sheep. Two Alaskan bears visited the tent one night (see text, page 395).

ern Canada, feeding as stolidly as sloths on the fresh vegetation that bordered the receding snow banks.

A cock spruce partridge came within five feet of the tent, evidently mistaking it for a snow bank; a brood of willow ptarmigan appeared in the willows just above my camp, and still higher up a fox brought to view a covey of rock ptarmigan. Moose signs were plentiful, but no moose were in sight. The air resounded with the loud, clear whistling notes of the hoary marmot, known to the trappers and traders of the Rocky Mountains of Canada and the mountains of Alaska as the "whistler" (see pages 398 and 399).

Then came the mosquitoes, the post-season crop of the higher altitudes. The insect-proof tent was a welcome place of refuge for the night.

On our way over the hills to the sheep country, we ran into a great swarm of yellow jackets which attacked us relent-

lessly. Recalling the Ojibway remedy for such stings, I applied a tiny portion of wax (cerumen) from my ear to the puncture I had received and realized almost instant relief.

I was somewhat amused when John came hurrying up, saying in true Norwegian, "These yellow yackets are mighty bad. Lend me some of your wax, for mine is all gone."

Many years ago I had this wax analyzed to determine the particular element that afforded relief. Although satisfied with the result of this inquiry, I decided that it was much better to depend on its natural production, as it would always be at hand. To some people this subject may seem indelicate, yet this secretion is as pure and clean as beeswax and its efficiency and availability should be widely known.

On the following morning I had scarcely finished breakfast when along came the men, red-faced and tired from their fight

against gravity and the worst of mountain trails. An hour later we were climbing over the broken rocks that littered the floor of the divide, and thence entered a great plateau that sloped southerly to Benjamin Creek. During the rest of the day we struggled through bushes, stumbling into grass-concealed cracks, leaping from tussock to tussock, and circling around swamps and mud holes.

While we were thus toiling, Tom pointed out a number of round dots of white on a distant ridge that looked like weathered boulders or snowballs from the frozen fields above. These were the white mountain sheep for which we were searching.

NOT SO EASY AS IT SEEMED

When I asked Tom, somewhat hopefully, whether it would not be wise to begin the camera hunt at once, since it made no difference whether we frightened these sheep or not, he politely concealed a negative answer by saying that if I would circle two miles to the left, and ascend to the mountain top from the other side, he would drive the sheep toward me before dark.

This did not promise well for our arrival at Benjamin Creek on scheduled time; and since Tom assured me in a sympathetic tone that I would see four or five sheep in the country near his cabin to one here, we continued the march, and at 6 in the evening came suddenly within sight of the cabin, 200 feet below a terrace that bordered the valley of the creek. John and I were quite exhausted, John still suffering from the after results of typhoid fever contracted on our trip to Mexico the year before.

The restorative effect of a hearty meal and the inspiration of the surroundings soon gave me sufficient energy to climb a hill behind the cabin, and there, at 8 p. m., I could see, at the headwaters of Benjamin Creek, three bands of sheep, all preparing to pass the night on little open benches not much above the meadows. Such a sight told the story of a seldom-visited country in which these wild flocks felt secure by night and day.

At 8 o'clock the next morning the party, with the exception of John, who was left in charge of the commissary department, was ready to start after sheep. After following the creek eastward for half a mile, we went up over a series of sloping meadows for three miles. A little above the cabin three small streams came together to form

Benjamin Creek. One flowed in a zigzag course from the snow fields on our side of the low divide above Skilak Lake, where the melting snow was likewise the source of Cottonwood Creek; another carried the overflow waters of a big pond in the highest meadow to the east; and the third drained several large valleys in the southeast.

The last two streams, lying between the highest and steepest mountains in the neighborhood, cut deeply into upland meadows that harbored not only the sheep I had seen the night before, but many others.

On the way up the valley we came to the last stretch of timber—spruce, mountain ash, and a considerable number of cottonwood trees, intermixed with willows and alders. At this terminus of the forest growth there were many trails of moose and numerous fresh beds made by these animals in patches of grass between the willows. It was obvious that the head of this high valley and the smaller ones containing willows were the summer resorts of the bull moose.

We found only two shed antlers in our extensive wanderings, one many years old, a fact that tended to confirm my opinion that all the moose that go to such elevations return to the shores of the lake and the adjoining lowlands in the late fall and mid-winter months. When Tom had hunted sheep here, he had always returned to the cabin at night; but, since to do so meant a waste of time and energy, we deemed it best to erect a tent in the midst of the range, where I could watch the sheep almost continuously during the 18 hours of daylight.

CAMP AT BIG POND

An hour after starting, we came to the pond. It seemed to be the best and most convenient location for my camp, since it commanded a view of three of the best sheep valleys, and yet was not too close to disturb the movements of the animals from one district to another. The tent was placed on a little knoll, close to a fine spring, where a great black mountain rising from the opposite shore of the pond afforded a striking background (see page 396). Numerous adjoining knolls covered with glacial rocks were the homes of many marmots, which viewed my canvas home with surprise and protestation (see page 398).

After luncheon we made a reconnaissance and located an unusually large flock of sheep up a valley to the north. There we passed the rest of the afternoon, with the



THE HOARY MARMOT IS RARELY FOUND BELOW TIMBER

These animals have a remarkable system of signals on the approach of an enemy. This one had just signaled the author's approach with an almost human whistle, as clear as a bell. The sound often confuses hunters who have been separated.

sheep brought within easy inspection by the use of a powerful field glass. The wind was blowing straight up the valley toward the flock, but there was no indication that any of them suspected our presence. I knew of the conflicting views held by sportsmen and guides in reference to the alleged inability of sheep to detect the nearby presence of man through scent, and it was one of my purposes to make every possible experiment to try to learn the facts.

Late in the afternoon Tom and Charlie returned to the cabin, leaving me to pass the night in the tent. Before dark I watched scattered bands of sheep leave the meadows for the higher slopes, where gradually they gathered into several good-sized bunches.

At 9:30 o'clock, when distant objects had become obscure, I went into the tent, and while slipping into the sleeping-bag happened to look out the wire ventilator in the rear canvas wall. I saw two large animals



THE ENTRANCE TO THE SHEEP COUNTRY IS A LOW DIVIDE 3,000 FEET ABOVE
SKILAK LAKE



A HOARY MARMOT IS AN ELUSIVE SHADOW SHAPE

The northern type of the American woodchuck offers a good example of protective coloration.
This one was photographed on a mountain at the head of Benjamin Creek.



ALASKA WHITE SHEEP ARE VISIBLE FOR MILES

This is a typical view of them on a high slope bordering the snow fields, where considerable fresh vegetation is found for a short period on spots recently covered with snow. The writer is not a believer in the theory of protective coloration applied to the larger animals of this country. Some of the smaller animals and certain birds, fish, reptiles, and insects, whose enemies are largely the same today as in the past, are undoubtedly preserved by oblitative or deceptive colors, as well as by concealing shapes.



THIS SMALL BAND OF WILD SHEEP HAD JUST COME FROM THE MOUNTAIN TOP

They were in a low meadow covered with the fresh grass and small plants they seek for food. Several lambs were playfully jumping over their mothers.



BADLY FRIGHTENED WHEN PHOTOGRAPHED, THEY RAN UP A ROUGH MOUNTAIN
The author found the mountain sheep exceedingly wary and difficult to approach. It was only by long hours of crouching behind a blind that he obtained this picture of them.



A EWE STOOD SENTINEL

After a long stalk on all fours, the author got within 50 feet of her. Note her extremely long legs. The short black horns and white body have led many of the Alaskan miners from the Rocky Mountain States to mistake the females of these sheep for white mountain goats (see page 413).



THIS BIG RAM WAS PHOTOGRAPHED AT 50 FEET FROM AMBUSH

He jumped the instant after the shutter revolved, but left his picture behind him. Note the fine poise of the head and the graceful horns (see page 411).

coming down a ridge a hundred yards back of the tent. My first impression was that they were sheep, or possibly caribou, but when one rose on its hind legs and looked about, I could only conclude that a pair of the big Alaska brown bears had come to the meadow to dig out marmots or ground squirrels.

These animals have a bad reputation among miners and explorers, due I think to their immense size and their near relationship to the grizzly, around which many of the blood-curdling tales of this country have been woven. From my own experience and the carefully sifted experience of others, I had long ago come to the conclusion that there are no dangerous wild animals whatever in the northern hemisphere, except the grizzly, and that this is dangerous only occasionally when molested. Having no intention of interfering with these visitors, I felt little concern, although I quite appreciated that it might be a dearly paid experience if I neglected all precautions.

I closed the opening of the tent and, when it was too dark to see anything fur-

ther, crawled into the canvas sleeping-bag. Once I thought I heard something sniffing behind the tent, but there was no way of determining the question without going outside. Gradually my nerves quieted and I heard nothing more until the buzzing of the mosquitoes greeted the early rising sun.

MANY FLOCKS OF SNOW-WHITE SHEEP

Several hours later Tom arrived with cooked food sufficient for three meals. After sampling some of this, we returned again to the elevated valley, where we had seen the sheep the afternoon before. The big band had broken up again into small flocks, which were feeding on the same meadows, some of them working down our way. The wind still continued to blow up the valley, but since I now wished to get some views of the sheep grazing on the meadows and determine just how close one could get before the scent created alarm, we cautiously approached.

When we were within 1,000 yards of the nearest flock, we made a little blind by cutting out brush in the edge of a thicket



THEY FED FOR HOURS, NONE LOOKING ABOUT SAVE THE SENTINEL (UPPER LEFT)

The keen vision of these sheep is practically their sole reliance for detecting danger. They always feed or rest on open ridges or hillsides devoid of bushes, from which they can have an unhampered view in every direction. They also possess unusual power of inference, detecting danger from the actions of other sheep, however distant the latter may be.

on the top of a mound, and there we went into concealment for several hours. All the sheep were gradually working down wind, and the prospects for obtaining pictures and for determining their scenting power were excellent.

When within 300 yards of us, the nearest flock began showing some uneasiness. The old ewe in front, which had charge of this particular flock, several times raised her head and sniffed the air suspiciously. At 200 yards the leading ewe stopped and looked directly our way.

PICTURES TAKEN JUST IN TIME

I felt sure the limit of the approach had been reached and forthwith took several pictures of the band. None too soon was this accomplished, for the leader turned back, and in a stiff-legged and peculiar way strode through the flock, with her little lamb following obediently.

All the other sheep, some of which were grazing and some lying down, seemed to take immediate notice of what was going

on; for when the old ewe reached the end of the flock and began to ascend the steep slope instead of continuing up the valley meadow, the rest fell in behind. In a few minutes a long file was zigzagging up the side of the mountain.

Here occurred another striking incident. Four large rams that had been reclining on the top of a flat rock 200 yards beyond the rest of the sheep all stood up and began looking about, first at the line of sheep ascending the mountain, and then down the valley. Whether their restlessness was due to the flock of sheep leaving the valley at that hour or to the manner or peculiar actions of the ewe, or whether they had got a trace of scent was hard to tell.

Soon the other sheep began working away from us, and finally dropped into a meadow walled in by a stone ridge that ran across the head of the valley, except where it was broken by a narrow opening through which a little stream dashed in a series of pretty cascades.

We saw none of the sheep drink water



THEY ARE CROSSING A SNOW FIELD TO CLIMB THE ADJOINING CLIFFS

Though they have fed all day in the valley meadows, they seek their eyries among the crags when night draws near. Their bedding places are seldom seen save by intrepid mountain climbers.

either from the streams along which they grazed or from any of the pools of water in the green meadows. Whenever the sheep became thirsty they always went to a snow field. So noticeable was this habit that I put in a part of one day getting into a position in which photographs could be taken of sheep coming to the snow banks to eat snow (see page 408).

A little later I saw a band of about 20

sheep coming on the dead run down the side of a distant mountain toward the meadow. They were jumping rocks, slipping and sliding down the steep sides of the bare mountain, and leaping across little terraces.

So striking was this sight and so certain was I that these sheep were badly alarmed that I aroused Tom, who was dozing in the sun a few feet away, and pointed to the sheep.



IT'S A WISE PARENT THAT CAN PICK OUT HER OWN YOUNG

In a high meadow still snow-flecked the two ewes on the left are having a disagreement over the ownership of four or five lambs that are playing together.

Looking at them for a moment, he said, "Why, those fellows are just coming to the meadow for their afternoon meal, and, seeing all the others at work, are losing no time in doing it. Just watch them and you will see that on reaching the bottom of the hill they will begin butting one another and cutting up all kinds of capers."

That is exactly what did happen; for when the sheep came to the edge of the little creek, butting matches began, and some of the lambs, in their playfulness, jumped entirely over their mothers. At the creek it was a pretty sight to see them leap from bank to midstream, where rocks amid swirling waters gave a footing, and thence again to the opposite shore.

The bunch of sheep that had come down the mountain in such haste either saw or smelled me when I photographed them, and they immediately departed by the same route they had come. Every sheep in the meadow behind the stone ridge left immediately for the mountain top. I was curious now to know just how this little meadow looked. We walked up and crossed over the top, to look down upon a beautiful spot. Below us was a circular meadow, containing a small but beautifully clear pond, and its trampled condition showed that every day the sheep came there for grass, which was unusually green and abundant. At one corner of the pond a good-sized mudhole was a possible indication of the presence of a lick, but I could not be sure of this at the time. I was sorry that I did not investigate it later.

This seemed an ideal place for close-range pictures, and we immediately began the construction of a blind on the face of the cliff overlooking the meadow. A narrow ledge gave just room enough for us to make a wall of flat stones behind which three of us could squeeze while we pointed the cameras downward. Our experiences in the blind the following day are described in my notebook:

A MORNING IN THE SHEEP BLIND

"August 12—Thermometer 75-52.

"Today was selected for a visit to the stone blind above the little basin meadow, regardless of wind or weather. The three of us passed a rather uncomfortable night in the small tent, and at an early hour I heard the men breaking the stunted willows for a fire and a cup of hot coffee. The fog for the first time had descended into the

valley, and no object more than 50 yards away could be seen. This condition resulted in a later start than we had intended.

"When we were half a mile below the blind, the fog lifted suddenly and the warm, bright sunlight so illuminated the valley and the mountain sides as to accentuate the obscurity it had replaced.

"Above us on the left, near the summit of the mountain, were about 40 ewes and lambs, all lying down, but evidently looking at us. Two hundred yards above the blind, and on the same side as the others, were two big rams a little distance apart. One was watching us most intently, and in a moment it began the ascent. The other, apparently alarmed by his companion's going up instead of down at the feeding hour, began to scan the bottom. He soon saw us, although we were standing motionless. Instead of retreating, he walked to the edge of a cliff and, standing like a marble image, gazed in our direction.

TOO LATE TO GET NEAR THE FLOCK

"Soon our positions became irksome and we started for the blind, while the ram immediately trailed after his more cautious companion and disappeared over the mountain top. Had we arrived an hour sooner, none of these sheep would have been disturbed, and probably others would have been attracted from more distant points.

"Entering the blind, we soon made everything ready for an instant or continuous bombardment. An hour passed and nothing came down any of the many runways radiating like gray ribbons from the green meadow.

"Finally Tom, who thought that the big flock of ewes was past due, climbed cautiously to the top of the cliff behind the blind. On his return he said that not a single sheep was in sight. Among this flock were many that had seen us slipping up the valley. They had received additional warning by the hasty departure of the rams.

"The 'sure thing' counted upon, like most predetermined results, had missed a cog somewhere. At length, four sheep appeared on the skyline two miles away and started down one of the big runways leading to the valley. They came rapidly and soon were standing on a bare plateau a quarter of a mile above the meadow. Here they stopped and looked below, but in a few minutes began grazing on the sparse grass. After remaining half an hour they took a



THESE SHEEP REFUSED TO DRINK WATER, BUT ATE SNOW INSTEAD

They had spent the entire afternoon on a meadow well supplied with water. Life on the high mountains, where most of the year there is no water, and what there is in the summer swiftly cascades from the snow fields, seems to have been the cause of this taste.



ALASKA WHITE SHEEP TRAVEL TOWARD THE LARGEST SNOW FIELD IN THE VICINITY

Note the four big rams on the upper edge, and how inconspicuous they are when compared with the smaller sheep on the dark soil. The curved and bulky horns of the four rams can be clearly seen. The rams spent most of the summer on the extreme mountain tops, rarely accompanying the ewes.



THE BAND OF SHEEP SHOWN ON PAGE 408 TOOK ITS TIME EATING SNOW

The flesh of a young ram is quite the equal of the best Southdown mutton. It is appetizing whether fried, roasted, or stewed. The carcass will remain in excellent condition for many days.

trail toward the head of the valley, where there were doubtless many other sheep.

"It was then that the idea occurred to me that the photographer might take advantage of this 'follow-the-leader' habit of the sheep by using a few light and portable life-size silhouette decoys of white paper or canvas, similar to those used for geese and cranes in parts of the West. Such decoys could be placed at strategic points near a blind before the sheep were astir in the morning, or near their trails back to their bedding ground before the time for them to return in the afternoon.

"They could be set at any desired angle where they could be seen a long distance and might save uncertain and wearisome hours in the blind. We had noticed how quickly and unsuspectingly small and scattered bands of sheep descended and joined flocks already feeding in the valley.

"At noon we opened the lunch box, but before we had fairly made a start at it I saw a big ram approaching along a ridge from the direction of our camp. He came

rapidly, with head up and steps mincing, looking very much like a small and sturdy caribou stag. When in sight of the meadow, he stopped and looked down for fully five minutes, occasionally scanning the mountains on our side.

"We feared that, like the others, he would turn away at the sight of the deserted meadow. Tom, however, thought that he was anxious to join a band of his fellows, and might cross to our side in order to look for them beyond. At any rate, the ram soon started down toward the creek. We were in doubt as to his final destination.

"At the edge of the bank he disappeared. We felt sure that he would come along our ridge, but on which side was the question. Several moments passed, and I feared he was then passing behind the blind, cut off from our vision by a wall of rock against which our backs were resting.

"Slipping over my neck the camera strap, I was in the act of climbing over the top of the blind when Tom seized my arm, whispering: 'Good Lord, here he comes right at us.'

"There was the ram, not 40 yards away, stalking along most unconcernedly in a direction that would bring him to a point where he could gaze down into the blind. The several portholes that we had made for the camera all faced the meadow, for an invasion from any other quarter had not been looked for. When the ram was within 75 feet of us, I was in a quandary. If I should rise up nearly full length above the low wall of the blind, he would be instantly alarmed, and I would have no time to obtain the sharp focus necessary for such a big lens.

"Holding my fire, I trusted to fate. When within 50 feet of us, the ram stopped, turned broadside, and nibbled at a sprig of vegetation. Silently and quickly in one steady motion, I arose, with my eyes fixed on the focusing mirror instead of looking directly at the ram. In the ground glass I saw his head raised suddenly and turned my way. Quickly the milled head of the focusing screw brought him in focus and the focal-plane shutter clanged harshly.

"His white form had vanished when I raised my head, and, to Tom's and Charlie's inquiring glances, I could say only that the effort was successful provided the ram was not in the air when the shutter revolved."

It was two days before I went to Tom's cabin. When darkness finally came at 10 p. m., I dropped the negative into the developer and in a few minutes saw on the plate the big ram, broadside, head up, gazing at the camera (see page 403).

PECULIARITIES OF THE SHEEP

Our last day at the head of Benjamin Creek was reserved for studying and photographing a large flock of sheep which heretofore had occupied the end of a ridge west of our tent, and which always fed on a large circular meadow nearly surrounded by small canyons. At no time did the daily program of the sheep vary. By 7 o'clock in the morning the entire flock of about 50 descended the mountain, crossed a little creek, and then in bunches of six to a dozen scattered out over the meadow, feeding not only on grass, but on small bushes.

Often some of these bands, containing many lambs, would work their way out to the edge of the meadow, fully three-quarters of a mile from the base of the mountains so that their retreat could readily have been cut off by a man with a rifle or by any fleet-footed predaceous animal. This, of course, meant that they had enjoyed entire absence



NAVIGATION WAS ON FOOT

In swift shallows the adventurers had to get out and drag the boat. It took only three hours to go down the stream but three days to ascend it.

of molestation during the season and probably for years.

I noticed that in coming down the steeper mountains the sheep usually took earth trails, however loose the soil or treacherous the shaly rocks. On their return, the steepest cliffs, if they afforded a good foothold, were ascended in preference to the nearby trails used on the descents. The probable reasons, if my brief observations warrant an opinion, were that on the descent the loose soil and tumbling rocks accelerated instead of retarded the progress of these sure-footed animals.

On the return, such conditions had the opposite effect. In jumping down from ledge to ledge, an animal weighing from 100 to 250 pounds might slip or break off a fragment of the ledge much more readily than when ascending. The sheep makes each upward jump lightly as a bird.

I had noticed, moreover, that at noon some of the sheep often returned for a rest on a lower slope of the ridge. We could not make a blind on the meadow without alarming them all, unless we built it at night, a difficult undertaking. I planned to



A TYPICAL HEAD OF A WHITE RAM

In 1884 E. W. Nelson first described a pure white species of mountain sheep inhabiting Alaska and northwestern Canada, naming it *Ovis dalli*, in honor of Prof. Wm. H. Dall, the well-known scientist and Alaskan explorer. While the horns of this species are not so massive as those of the Rocky Mountain Big Horn, or the base circumference equal to that of the Big Horns or of the southern California species, the extensive spread and graceful symmetry, in connection with the beauty of the head, make them a prized trophy. The greatest spread of a Kenai ram's horns has been recorded as $27\frac{1}{2}$ inches.

get on the ridge in the morning after all the sheep had gone to the meadow, when there would be some chance to obtain pictures in case any returned at noon and, a greater certainty, toward night as they assembled in the vicinity of the blind.

After we broke camp in the morning, Charlie continued with his pack down the valley to the cabin. Tom and I left our packs near the pond, where we intended wading the outlet stream so as to reach the base of the ridge at a point where nothing could see us from the meadow. The stream proved much deeper and swifter than it looked at a distance. Although we did not

object to a wetting, we feared being carried off our feet, with resultant injury or loss to the photographic outfit. A rifle will stand much more ill-usage than a camera. We put in nearly an hour gathering and throwing flat stones into the swift water before we obtained a footing that we felt was safe.

On reaching the edge of the ridge about 200 feet above the meadow, we could see many scattered bands of sheep; but, to our disappointment, a dozen sheep were now coming along in single file toward the ridge. They were already too close for us to pass around and get in a position to meet them on their ascent. There was nothing to do

but to await developments. In a few minutes they had jumped the creek, one lamb falling over backward into the water, much to the indignation of its mother, who stamped her feet vigorously as her bedraggled offspring endeavored to climb the steep bank. With a single and later exception, this was the only time we saw any sheep, big or little, prove awkward or careless.

When the band finally came up the slope they were soon lost to sight, and we waited until they had time to reach a resting place. On climbing to the rim, I saw the flock about 200 yards to the left and on the same level. All were lying down, save one which acted like a sentinel.

PHOTOGRAPHING THE SENTINEL EWE

After carefully studying the approach and figuring on the possibilities of remaining concealed, Tom assured me "that with ordinary crawling ability one could get within 50 feet." Tom could crawl like a serpent and climb like a squirrel. He had the equipoise and jumping ability of a mountain sheep. Consequently his encouragement was of doubtful character.

Experience had taught me that, although it was important not to be seen approaching, it was equally important, when armed with a camera, to know the exact position of the animals in relation to the last cover sought. I started on all fours, a mode of travel rendered more difficult by my being obliged to push the heavy camera ahead.

When I reached the final rock, I carefully pushed a piece of small brush to the top of it and, raising my head, looked through the branches. This method might excite a puzzled interest if any movement should be observed by animals at close range, but even so it was safer than to let my head appear suddenly to their view a few yards away.

All the sheep were in a row less than 20 yards away, the sentinel ewe standing with a little lamb at her feet, and the rest lying down nearby. I could see that it was impossible for the plate to cover them all in proper focus. I would photograph the sentinel ewe and her lamb to supplement the picture of the big ram and complete a family group.

In a moment I arranged the camera at a focus that would probably require no further change when brought to bear upon the sheep. Lowering my eyes into the hood surrounding the focusing mirror, I slowly

arose, and when the camera cleared the top of the rock I found the sentinel looking directly at me and in sharp focus. Without a moment's hesitation I pressed the button, and the shutter revolved. What the camera saw is reproduced on page 402.

Before the frightened sheep had time to gather their wits, I had reversed the plateholder. I caught the band as it struggled in a disordered way over the broken rocks above me (see photograph, page 402).

We set about constructing a comfortable blind between rocks that concealed us from animals coming from below or above, and where we could remain the rest of the day watching the scattered bands of sheep on the meadow below. It seemed that practically every such band had a leader, readily picked out when the sheep were moving from one locality to another or were feeding. And this today is a predominating characteristic of domestic sheep that has survived from primitive times. A dread, growing out of their exposed position and distance from the mountains, was manifested by the way the sentinel sheep continuously surveyed the country (see page 404).

Mr. Charles Sheldon, who is accepted, and properly so, as the leading authority on northern sheep, inclined strongly to the belief that such bands of sheep have no sentinel in a strict sense, but rather that the more alert or experienced of the members at times give the appearance of prearrangement for guard duty.

SHEEP REALLY HAVE A LOOKOUT

Such a conclusion is undoubtedly true in the case of caribou and elk, but in the case of sheep, where gregarious ties are very strong, it seems to me that the selection of a leader or the voluntary assumption of leadership by an individual, who watches over the flock for days and perhaps seasons, presupposes responsibility for lookout duties, unless such a leader is thoroughly satisfied that every condition is favorable to the security of the flock.

While I was making observations, Tom was devoting himself to watching the mountains above. He finally discovered coming down toward us a ewe, which he thought was one of the sheep that might not have seen us clearly when the stampede took place and was anxious now to join the other sheep feeding in the meadows. Its course would bring it some 20 yards to the left of

us, and well out of way of the quartering wind blowing up the mountainside.

When within 75 feet of us, the sheep turned to the right, and, since we knew that its course would bring it across the line of our scent, I was most anxious to note the results, even if I lost the picture. When the animal was between two rocks, with only its head and shoulders visible to us, our scent struck it suddenly. The ewe winced as if shot and dashed upward again with the speed of a deer. Her action showed pretty conclusively that a sheep at close range has a good nose, at least when it has been previously alarmed.

A PROPITIOUS MOMENT

At length the animals on the meadow turned toward us, and as band after band came up our side of the hill, we thought the time right for a series of pictures.

The leader of the first flock began watching the side of the mountain, advancing 10 or 15 feet and then stopping for a minute or two; during such intervals the rest of the band continued to graze and some of them would lie down. By the time the leader reached the creek, she had apparently become suspicious for some reason, and stood eyeing the entire side of the mountain. She finally lay down with the others, but with her head turned toward the mountain side. Unquestionably the absence of sheep from the place in which they were accustomed to gather in the afternoon, and possibly the ascent of the first flock, had something to do with her uncertainty.

Meanwhile, within 50 yards of the first, had come another band, also led by a ewe, which acted very much like the first. In a few minutes the two bunches commingled, and, to our regret, soon began retreating toward the meadow, where they stood in an uncertain way for a long time. Then the two bands separated, one continuing up the little creek.

The manner of the leader, which was looking steadily at a distant point on the side of the mountain, led me to turn the glass in that direction, and I saw four sheep on the edge of a cliff. Toward these the band was evidently going. Soon the others were on the move across the meadows, all, with the exception of one distant flock, headed for the same spot. We saw our chances of obtaining photographs fading away.

In a short time these flocks had joined

the four sheep at the other end of the ridge, a portion, doubtless, of the flock which we had previously photographed, and which had sought out a new place for the night. At 4 o'clock the little band of sheep that had been feeding at the extreme western end of the meadow came trotting back on a well-defined trail bordering a canyon, and I felt almost certain that none of them would come to our blind, although on five previous days all the sheep had gathered every afternoon just above it.

Now, more than ever, I was convinced that a set of sheep decoys, as suggested previously, would have brought most of these sheep within photographing range. Tom thought that even a white linen night-shirt would have answered if he would have been permitted to trot about in it in front of the blind.

While the last flock continued to approach, it seemed best to slip down the side of the slope as close to the creek as possible and try for a picture as they went by. When we had gone a third of the way down, I found that they were coming more rapidly than I expected. In an effort to pass an exposed place between two rocks—a crossing that should have been made by slow crawling—I carelessly jumped across. As I landed behind the sheltering rock, I heard Tom's warning whistle.

Looking down on the meadows, I saw that all the sheep had reversed ends and were rushing back again. Since these animals were more than a quarter of a mile away, their behavior was a good illustration of their acuteness of sight and their quickness in realizing the character of the danger.

THE SHEEP WERE TOO QUICK

Not knowing how these sheep could escape in the direction they were going, I called to Tom for advice. He yelled that they were headed for an ice bridge across the canyon, and he thought they would swing toward us again after crossing this to ascend the mountain slope behind.

I exercised all the energy at my command, but the sheep won. I could see them 200 yards below quartering up the mountain. In a few minutes they reached a ledge of rock within a hundred feet of the crest of the great black cliff opposite the site of our former camp. This was our last view of the white mountain sheep until two days later, when we entered the pass of the low divide above Skilak Lake.

Our visit had made the sheep considerably wilder, and the flocks that formerly had rested each night on the lower benches now whitened the ledges of many a high cliff. No red had dyed the white and woolly sides, however, and no flock looked for an absent one within its ranks. The next morning we left for Skilak Lake, and camped half a mile from the low divide, giving the men an opportunity to make a further trip to the cabin that day.

At an early hour the next morning we took down the little tent and cached it with other articles to be called for the following day. With heavy packs we began trudging along the slight rise to the low divide, through which Cottonwood Creek ran on its short and rapid career to Skilak Lake, 3,000 feet below.

It was here that I obtained my last photographs of rock ptarmigan, and before we climbed up on the broken masses of rock that littered the pass between the cliffs of the divide, I put away the lenses and boxed the camera in case some one should suffer a fall on the insecure footing.

A LAST VIEW OF THE WHITE SHEEP

Halfway through the pass we noticed, almost overhead, seven or eight sheep lying on a narrow ledge with a perpendicular drop of nearly 300 feet beneath them. To one who had seen large white gannets nesting here and there upon the face of a maritime cliff, the resemblance to them was a striking one. Before I could get the camera out and arranged, the sheep, noticing that we had stopped and were gazing upward, became alarmed. In a series of awe-inspiring leaps they took ledge after ledge until they reached the top, where they all lined up and looked down at us. My last but still lingering mental picture of these graceful creatures shows them poised on the highest summit above Skilak Lake.

Impressed once more with the agility and self-confidence of these nomads of the crags, I asked Tom whether he had ever seen the remains of any that indicated that sometimes sheep paid forfeit with their lives for a careless gambol or a desperate effort to avoid pursuit. He replied that in nearly 16 years in the sheep ranges of Alaska he had never seen a single case of the kind, although several times he had found carcasses at the ends of snow avalanches.

Within a few short hours and at the same spot a tragedy occurred that constituted a

most remarkable answer to my inquiry. After returning to the lake and remaining overnight, Tom and Charlie started back the next morning for the tent and the remainder of our outfit. In passing through the same divide Tom saw, hanging partly over a ledge and midway between top and bottom, the crumpled body of a large, fine ewe. Running about below was a little lamb, which, whimpering and bleating, continued to look up toward the spot no feet could reach.

A TRAGEDY OF THE CLIFFS

How this accident happened is, of course, a matter of surmise. However it may have occurred, we know that when time passed and the mother failed to return, the little fellow by a circuitous trail reached the bottom of the pass, to be no nearer than before to the only one it loved. Let us trust that before the day had passed the little lamb saw a white line zigzagging into the valley, which he dimly knew was the pastoral range of his mother's clan, and that he found a welcome within the ranks.

All animals develop the abilities and characteristics necessary for their safety and for the other requirements of their lives. Mountain sheep are agile, sure-footed, and keen of eye. Experience and practice are their spelling book and primer. Every one has seen a kitten chase the end of a string in motion, or even the tip of its own tail, or run up and down the trunk of a tree apparently in sheer aimlessness. By these motions it is educating its muscles to play the part it must take as a member of the cat family.

The young lambs we saw among the flocks on the mountain slopes were very playful. They frolicked about, jumping over one another's backs, and sometimes leaped from shelving rock slopes to the tips of little pinnacles so small there was hardly room for their little feet. They often appeared in danger of bad falls as they turned about on such precarious footholds in order to leap back, but they never lost their footing. This youthful play of course fitted them for their future life among the gigantic mountain crags where a single misstep might be fatal.

The snowy-white sheep of the Alaskan ranges, with its slender, gracefully curved and often waxy, yellowish horns, is probably the most beautiful of its kind in the world. At the time of my visit they were



TRAILS ARE OFTEN HARSH WORK

The worst part of tracking requires the men to wade in swift water of uncertain depth to avoid log jams and overhanging trees.

abundant in the mountains of the Kenai Peninsula and in the Alaska Range westerly toward the head of Bristol Bay as well as on the little-known Endicott Range paralleling the coast of the Arctic Ocean on the north. From these mountains they range eastward into the northern Rocky Mountains of Yukon Territory.

COLORS OF THE WHITE SHEEP VARY WITH CLIMATE

Throughout the range of the sheep in the Kenai, in the Mount McKinley region and the Endicotts, the freshly grown winter pelage is snowy-white, with now and then a black hair on the top of the tail. These black hairs become more numerous in the sheep found in the mountains near Yukon Territory and through the southern part of that area into northern British Columbia, the tops of the tails sometimes becoming all black and the fronts of the forelegs dusky until, through an area in which the sheep have an amazingly varied amount of dark colors on the back and elsewhere, the dark-colored Stone sheep (*Ovis dalli stonei*) are developed in Northern British Columbia. During the months following their assumption of the winter coat, contact with the earth in their bedding places stains the pure white sheep to a dingy or dirty white.

The white sheep is a lighter, more gracefully proportioned animal than the well-known Rocky Mountain bighorn of ranges farther south. The large bucks are reported

to weigh from about 200 to 250 pounds and the ewes much less. In 1907 a ram with horns measuring $14\frac{1}{4}$ inches around the base and having a spread of $27\frac{1}{4}$ inches was killed on the Kenai. The horns of the ewes and yearling rams extend up and back in curves that, seen at a distance, have given rise to the unwarranted opinion by numerous hunters and prospectors that ibex also occur in the Alaskan mountains.

Man is the most destructive enemy of the white sheep, but it is a victim also of wolves, coyotes, lynxes, wolver-

ines, an occasional big bear, and many golden eagles.

Although so numerous and widely distributed in the northern mountains of Alaska and western Canada, these sheep remained unknown to science until specimens were obtained for E. W. Nelson from the upper Yukon region, through the cooperation of the well-known northern pioneer, Jack McQuesten. Doctor Nelson, who described the species in 1882, named it *Ovis dalli*, in honor of the early Alaskan explorer, Dr. W. H. Dall.

When they are on a snow-covered slope, or on one of the many scattered patches of snow in their summer haunts, the white sheep are very difficult to see. Their color blends so perfectly with their background that only when the sun is at such an angle that it casts their shadows on the snow may they be located easily. When they are on bare ground, the reverse of this becomes true and they are conspicuous. Their white forms stood out so strongly when they were grazing on green slopes that I could see them sometimes at a distance of two miles.

On our return from the mountain country our camp was located at the farther end of Caribou Island, a few miles west of Doublebay camp, and opposite the moose lick.

This island has a length of about three-quarters of a mile, and has a maximum width of one-third of a mile. Except for a few acres of pine, it is covered with a vigor-

ous second growth and some swamp land, the result, probably, of the same fire that cleared so much of the shore opposite.

And here it may be remarked that, however wasteful in a commercial sense may have been many of the forest fires in the wilder portions of our continent, they nevertheless have often been of corresponding benefit to the game and range stock.

The replacement of dense and often stunted and useless conifers with poplar, birch, cherry, oak, beech, and maple, and the subsequent appearance also of meadows and glades covered with grass, moss, bushes, and small herbage, have done much to supply an abundant and nutritious variety of winter and summer food, valuable alike to the larger game animals, domestic stock, pack horses, many game birds, and small quadrupeds, few of which resort to or can thrive throughout the year in the dense, dark evergreens of the North.

In recent years hundreds of thousands of acres of such second growth have sprung up in Alaska, and nowhere has it been of greater advantage to game and the pack trains than throughout the interior of the Kenai Peninsula. Caribou Island, subjected to easy examination, showed that on the coming of the ice it was visited by many moose, and the abundance of spruce partridges indicated their appreciation of the berries and swelling buds, just as the rabbits thrived on the tender bark and great variety of smaller plants.

In its isolation the Kenai Peninsula is like a great island, allowing a marked segregation of northern game, for it is naturally favorable to their existence and is now much improved by physical changes, the ease with which the game laws can be enforced, the concentration of Indian settlements near the canneries, and the practical extermination of the wolf.

Reports of those best acquainted with present conditions show that the moose have been increasing steadily in recent years, that the white sheep are thriving,



OCCASIONALLY THE GOING BECOMES EASIER

This was a restful half mile where the original forests on the bank had been cut down by Russians in 1857.

and that all other game animals except the small fur bearers and the caribou are holding their own. Just why the caribou was approaching extinction on the peninsula no one seems to know, but I am glad to report that a good-sized stag was seen south of Benjamin Creek by a party of surveyors in July, 1910. Since much of the peninsula is well adapted for caribou, an effort should be made to introduce them into the region, the interior of which will readily support many thousands.

CHARLES SHELDON AND THE MOUNT MC KINLEY AREA

During this expedition my interest and enjoyment of brief and distant glimpses of majestic Mount McKinley were enhanced by my recollection that my friend, Charles Sheldon, had passed a year—1906-7—near its northern base. There he trod little known valleys and climbed many dangerous mountain slopes hunting and studying the white sheep, caribou, moose, bears, and smaller forms of wild life. On his daily expeditions he hunted alone, and with rare persistence wrote his diary records in detail each night. For some reason that I never understood, this valuable and interesting description of an almost unknown region did not appear in print until two years after his death, when it was issued with a foreword by Dr. C. Hart Merriam.

This work bears the title "The Wilderness of Denali," the name by which the



THE WRECK OF THE "RAMONA"

This lifeboat loaded with people from the lost ship arrived at the *Northwestern* on which the author was traveling home from Alaska.

mountain was known among the Indians living near its northern base. It seems a pity that this spectacular eminence has not been called by its picturesque Indian name, as was so much desired by Sheldon, instead of being named after a political leader who never was in Alaska and who knew little or nothing of the far North.

As a result of his several visits to Alaska, Sheldon became impressed with the idea that the region about this mountain should become a national park. The completion of the Alaska railroad extending from Seward to Fairbanks made this mountain area readily accessible to the public by a comparatively short highway. Soon thereafter Sheldon initiated the movement that resulted in the establishment of the Mount McKinley National Park and thus created a permanently protected home for some of Alaska's big-game animals.

The National Park Service informs me that in 1931 this area contained approximately 13,250 Dall sheep, 25,000 caribou, 60 moose, 50 grizzly, and 15 black bears.

Many know that this mountain is the highest on the North American continent, but the fact that it rises higher above its base than any mountain in the world is not generally known. The great peaks of the Andes and the Himalayas rise

from bases already well up in altitude, whereas McKinley rears its 20,300 feet of height from a base only 2,500 feet above sea level.

The ease with which even the least experienced and venturesome of travelers may now reach many of the wild places of the earth and enjoy the spiritual uplift that comes from viewing magnificent scenery is well illustrated by the history of Mount McKinley. This highest peak of North America, located in the wild interior of Alaska, was the last of our great mountains to be discovered. For years following this it was considered a feat of skill and hardihood merely to reach its base. Even as late as 1906 Charles Sheldon found it a strenuous task to enter this area and return from his camp using dog sleds or pack horses according to the season.

Today, as a result of the establishment of McKinley National Park, such conveniences for travel have been provided that I venture to say that one might leave the city of Washington, and by the use of railroad trains, steamships, and motor vehicles, arrive at Copper Mountain Camp, fronting one of the greatest glaciers on the base of McKinley, and commanding a superb view of this majestic mountain, without the necessity of walking 1,000 feet.

CHAPTER XVIII

Hunting Great Brown Bears in Alaska

THE trip to the Kenai Peninsula in 1911 proved to be so interesting that in 1913 I undertook another Alaskan venture. This time I was accompanied by my son George and, as before, by my Michigan guides, John Hammer and Charles Anderson. During the first journey, the purpose of which was to photograph the giant moose and the white sheep, I had enjoyed no opportunity to study the great bears that are so numerous in some localities. My son was particularly eager to hunt the great brown bear and the diminutive Sitka black-tailed deer.

AN UNPROFITIOUS START

The beginning of our journey from Marquette was not propitious, for the first night out the train was wrecked by running into a large white pine that had been blown across the tracks during a terrific thunderstorm. The engine rolled over two or three times, killing the engineer and firemen and two trainmen in the adjoining car. All the lights in the train were extinguished, and we made our way forward by the intermittent illumination of lightning to view the harrowing sight. Learning that the road would be blocked until the next morning and that the next train would get us to Seattle only a few hours before the departure of our steamer, we returned to Marquette and changed our reservations to a boat that was to sail a week later.

During our voyage north from Seattle the weather was fair, and the trip through the inside passage was most enjoyable. In the absence of fog or rain the abrupt mountainous slopes that rise from the water's edge beside the narrow channels between the islands stood out clearly. To take advantage of the long hours of daylight at this season we remained most of the time on deck. The perils of navigation in these parts were impressed upon us by the sight of the hulks of several passenger steamers that had met their fate in fog or snow storms when the swift tides had carried them out of their narrow courses.

Our plan was to hunt first on the lower Copper River, where bears were said to be numerous, and then to return to Admiralty Island. On reaching Juneau we called upon

the superintendent of the Copper River railroad to arrange for our transportation up the river. He was in bed as the result of a peculiar accident in which he and a companion had been thrown from their railroad track cycle when it collided with a stray horse. His companion had been killed.

The superintendent was propped up in bed reading the July number of the NATIONAL GEOGRAPHIC MAGAZINE, which contained my article on "Wild Animals that Took Their Own Pictures by Day and by Night." He was therefore in a mood to help us on our trip.

From Juneau we went by steamer to the end of the railroad at Cordova. There, in addition to our canoe, we hired a heavier boat for the outboard motor. An old and water-soaked craft, weighing probably 300 pounds, it set so deep in the water that progress in shallow places was difficult.

Our destination on the railroad was "Mile 84," near a section house, where our mail could be delivered. At this point we crossed Copper River, which there was more than half a mile wide, to a camping place a short distance above the mouth of a smaller tributary known as Bremner River (see page 422). It is about the mouth of this stream that many bears gather each year during the run of the salmon that ascend the smaller streams to spawn. It was not until the day after pitching camp that we discovered we were on an island.

NO BEARS, BUT MANY TRACKS

Naturally, after landing, and while the guides were putting up the tents, I looked about for bear signs. I was amazed to see hundreds of tracks, big and little, on the mud flats; but all of them appeared to be more than two weeks old. The skeletons of salmon and the uprooted skunk cabbage along the shores showed that many bears had been active here only a short time before; but all the salmon had gone upstream and the bears had followed. This meant that we must try to locate them nearer the headwaters. Since the stream came out of one of the highest mountain ranges in this region, we expected to find good trout fishing, for there the water would be clear and cold.



GEORGE SHIRAS, 4TH, PROVIDED GAME FOR THE POT

The youngest member of the party brought a welcome offering of ptarmigan into camp near the mouth of Bremner River (see also page 430).

Willow ptarmigan were numerous about camp, but were very wild, although they were seldom shot at. This condition I attributed to the presence of many hawks. The ptarmigan rarely ventured more than a rod or so from cover and took refuge promptly when alarmed, so that it required quick and accurate wing-shooting to bag them. My son enjoyed this sport very much, and it kept him busy supplying our needs. We were delayed for several days trying to work out a method of going up the stream, for unusual difficulties beset us.

The water in Copper River was lower than it had been for many years, with the result that the Lower Bremner, instead of being banked up by the larger stream, was also drained to a low stage. We managed to get our motor boat some distance upstream, but the water was so muddy that it was hard to find a channel. Most of our

time was devoted to getting free from mud bars over which two or three inches of water flowed with the same speed as in the channel.

Half a mile above the Copper we came upon a flat-bottomed boat with its bow buried deeply in the muddy water. On the stern was an outboard motor. Who its occupants had been and whether they had escaped death we never learned.

It required both of our boats to move us and our outfit, and after persistent efforts we became convinced that we could make only slow and uncertain progress. We decided to return to Juneau and to outfit for Admiralty Island, on which bears were known to be numerous and accessible.

As we were breaking camp the next day, the first rain of the trip began to fall. While we were crossing the river, the little motor boat was caught in what appeared to be a

dangerous eddy, caused partly by a heavy wind that blew down the river. The boat seemed about to upset, and Anderson, who was in the bow, jumped overboard into the chilly water so as to lighten the load. We all let out a loud shout of laughter when we saw him land in about 18 inches of water. He looked back at us with a sheepish grin, but nevertheless he got the credit for a courageous act in an apparent emergency.

The bed of the Copper River railroad was laid in places on earth-covered glaciers, which in the summer were continually melting so that the rails sagged at times sufficiently to interrupt traffic. This was the situation the afternoon we loaded our outfit on a car to return to Cordova on our way to Juneau. The section men on the road worked for several hours propping up the track before we could go on.

Near here is the famous Childs Glacier, which can readily be seen from the train. At other points along this coast are large glaciers, from which huge pieces of ice now and then topple into the water, but they rarely float out into the open sea as they do off the Greenland coast.

Although at that time the coyotes had not invaded the Upper Copper River Valley, they had already entered Alaska, and since then they have reached the sheep ranges along the headwaters of this river. It seems justifiable to make reference here to the northward spread of these carnivores because of the possible disastrous effect they may have on certain valuable northern birds and mammals.

COYOTES INVADE ALASKA

At the time of the Klondike gold rush coyotes are said to have followed the overland trail northward through British Columbia to Yukon Territory, being attracted by the carcasses of pack animals that perished there. This brought them to a region that supported so much game and other wild life that they have spread over enormous areas. They are now found about the upper drainage of Copper River and beyond the Yukon Valley to the north and west. They occur yearly throughout Yukon Territory, and some have reached even to the Lower Mackenzie River Valley.

They are the most dangerous enemy of Alaska game, both great and small, that could have appeared in that region, for they menace the big game throughout the

year, including lambs of the mountain sheep along the crests of at least some of the ranges, and they have already begun depredations among nesting migratory wild fowl to an extent that may prove disastrous to some of the geese and other species.

A cooperative campaign to control them is being conducted by the Biological Survey and the Alaska Game Commission, and many coyotes and wolves have been destroyed. The country is so vast, so thinly populated, and so lacking in means of communication, and the coyotes are so difficult to capture, that their control has become a serious problem in the maintenance of Alaska game. It is possible that the long, severe winters of interior Alaska and far northern Canada may prove a determining factor in controlling their numbers. Some evidence of this appears to be indicated by their decrease in the Upper Copper River country during 1930 and 1931.

WE LEAVE JUNEAU FOR ADMIRALTY ISLAND

From Cordova, after our fruitless search for bears on the Copper River, we went direct to Juneau by steamer. The morning following our arrival at the capital of the Territory we met the well-known local guide, Allan Hasselborg, who had over a period of several years collected many specimens for Dr. C. Hart Merriam, former chief of the Biological Survey, long engaged in a monumental study of North American bears.

Hasselborg was just recovering from severe injuries inflicted by a grizzly. He had mortally wounded the animal at close range on a steep hillside, but the dying bear had seized him and badly lacerated his arm as they rolled together to the bottom of the gulch.

Apropos of Doctor Merriam's work, I may add that before we left for Alaska a friend in Washington remarked, "For heaven's sake don't bring back with you a new species of bear, or Merriam will never finish his book." This very thing happened as regards the bear, and Doctor Merriam gave it due attention.

On our first meeting with Hasselborg we discovered some of the eccentricities for which he is noted. He refused to enter the hotel to talk over plans for our trip, saying that he always took cold in a house, especially a public one. For years he had lived on his little launch, and if anyone wished



THEY TOOK TO BOATS ON THE COPPER RIVER

The party left the railroad at Mile 84 to cross over and camp near the mouth of the Bremner River, a reputed gathering place for big bears.



UNUSUAL WEATHER MADE UNUSUAL SCENERY

As the little craft passed down Frederick Sound, from Juneau to Admiralty Island, the detached and stranded ice from a nearby glacier glistened blue and white beneath a sun that was celebrating its farewell appearance, for thereafter fog and rain screened the island camp for days at a time.



THE PARTY'S LOCATION ON ADMIRALTY ISLAND PROVED FORTUNATE

The new species of bear was first sighted on Admiralty as it came to the beach opposite this camp. On the mountain slopes the author saw hundreds of the little Sitka blacktail deer.



CAMP IN SHELTON COVE, ADMIRALTY ISLAND, WAS WET

Here the party hunted bears while rain fell for nearly 18 consecutive days. The great cedars deluged the tents on each heavy puff of wind. There was an attractive and convenient spring-fed fresh-water pool in front of the camp site.



HERRING AND GLAUCOUS GULLS FISH FOR SALMON EGGS

to talk to him under cover there he would have to go.

We later found that his boat was small, it being intended for only a guide and one hunter. Before our return we had some trying experiences with the overcrowded craft. The morning we left Juneau for Admiralty Island the weather was perfect, and the trip along the passage to Frederick Sound was most interesting, the sunlight bringing out with fine effect the blue-white of the glaciers and the varying shades and tints of the forested mountain slopes.

ADMIRALTY ISLAND

It was long after dark when we entered Sheldon Cove in Pybus Bay at the south end of Admiralty Island, one of the largest and finest of the Alexander Archipelago. Our confinement all day in the small cabin of the motor boat had nearly stifled us, and we proceeded at once to put up the tent. The tide was high and the launch was anchored only about a hundred feet away from the camp site. It was the identical site occupied by Charles Sheldon and his bride in September, 1909.

As we groped about we discovered the foundation logs of their camp, the walls of which had been built up about four feet and

then topped with a canvas roof. Sheldon's account of this visit had been published in 1912, the year after my first trip to Alaska, and his description of the rugged wilderness, with its many bears and deer, had so impressed me that Admiralty Island was the place I most desired to visit on this trip.

CHARLES SHELDON

It gives me pleasure to present here the valuation placed by Doctor Merriam on the work and activities of this fine man and good friend, whose untimely death in 1927 was so sincerely regretted by all who knew him.

"Among the hunter-naturalists of America Charles Sheldon occupied a unique position. For, notwithstanding his attitude of self-effacement so well expressed by George Bird Grinnell—'he was our most famous big-game hunter.' Choosing his hunting grounds in some of the most remote and inaccessible parts of the continent; possessed of physical strength and endurance almost beyond belief, of unbounded enthusiasm, of powers of observation second to none; and endowed with a conscience intolerant of exaggeration, he gave accounts of his hunts that abound in vivid descriptions of localities not previously explored.

"His circumstantial studies of the habits of animals rank among the most valuable of the contributions thus far made to the life histories of many species—particularly the mountain sheep, caribou, moose, grizzly bear and wolverine."

On the coming of daylight we viewed our surroundings with much interest. The launch was now lying about a hundred yards from the shore, for the tide was low. Since the rise and fall of the tide amounted to 18 feet, it was sometimes possible to row up to the front of our tents. At other times we had to struggle through a long stretch of mud, over which, when necessary, we pulled the smaller boat. The sky was cloudless and the temperature agreeable.

HASSELBORG PREDICTS FOG

As we were putting some finishing touches to the camp, Hasselborg said to me: "If you want to take some pictures of the surroundings, you'd better do it now, for rain and fog can soon be expected."

I recalled the Sheldons' experiences here of 18 days of continuous rain, often mixed with fog. Hasselborg's warning was timely, for later we broke the Sheldon record by a day.

Before noon on September 2, I went with Hasselborg in the rowboat to a small salmon stream that entered the bay about half a mile to the east. When we were half way across, I saw three bears leave the brush and come to the beach, and I whispered to the oarsman: "There are three black bears on the beach."

Without turning his head to look, he replied, with marked irritation, "There are no black bears on this island."

To this I retorted, "I did not mean the American black bear, but bears of a black color, and coal black at that."

At this he turned his head quickly and then gave a surprised whistle. Just then all three animals rose on their hind legs, evidently looking at the approaching boat.

"They are getting ready to leave," Hasselborg said, and a moment later they hurried into the brush. "Those were the strangest bears I have ever seen," he continued, "and I have been up north a good many years. . . . It was a large female and two two-year-old cubs. The only bears known on this island are the big brown bears, and the three we saw must belong to an unknown color phase of this animal."

It may be said at this point that in the

next two weeks we saw four more big adult black-colored bears. We felt sure that these animals must represent a black phase of the big brown bear common on the island, just as there is a brown phase of our common black bear that is usually called the cinnamon bear. Later, when Doctor Merriam examined our black specimen, he found from its skull characters that it was a new species.

True to Hasselborg's predictions, a hard rain began the next day and continued for 19 days, with one let-up of five hours and another of nine. We had so-called waterproof tents, but they all leaked badly except the paraffined cook tent. This was not surprising, for our canvas was spread under some huge red cedars, and these would collect many gallons of water, which would be precipitated upon the tents whenever a gust of wind struck the treetops. The continual hammering soon forced the water through the canvas.

Although our tents did not keep out the water, they held it excellently after it entered. The floor cloth of each tent was of heavy waterproofed material that held the water that penetrated the roof until it was bailed out each morning.

After three days of the downpour I became worried about a camera and flashlight machine that I had placed up the stream at a pool where the bears were making daily raids on the salmon. The camera had been set several feet above the stream and was wired to a log as a matter of precaution. The lens with it was the one that I valued highly, for with it I had taken my first series of flashlight pictures of deer more than 25 years before.

THE CAMERA SUBMERGED

Upon arrival at the place where the camera was set, we found it submerged and bounding up and down in the swift current, but it was held securely by the wire. The camera box was ruined, but the lens, when cleaned, proved to be uninjured. Weather conditions continued to prevent daylight photography, except during five hours of sunlight, when, in addition to pictures of gulls, I obtained several showing surf birds and black turnstones.

The numerous salmon streams of Admiralty Island are interesting; for, after descending in beautiful cascades from the hills, many of them have courses only a few hundred yards long. Four of these



GLAUCOUS-WINGED GULLS GATHER ON SALMON SPAWNING BEDS, ADMIRALTY ISLAND



THESE GLAUCOUS-WINGED GULLS ARE TRAVELING TO THE FEEDING GROUND SHOWN ABOVE

streams enter Pybus Bay within easy distance of our camping place, and in the more remote parts of the island are many others.

To rivers like the Yukon or the Columbia, where salmon often ascend more than a thousand miles to spawn, these streams afford a remarkable contrast. That a sufficiently regular supply of water can be maintained in these streams to support the several species of spawning fish that frequent them throughout the summer seems incredible to one accustomed to more southern waters.

STREAMS ABUNDANTLY FED BY RAIN
AND MELTING SNOW

Their regular supply, however, is due to two alternating causes—the almost continuous rainfall at this season and the powerful effect that an all-day sun exerts on the snow fields and glaciers when the sky clears for a day or two. In such short streams the salmon are naturally confined to a few pools, with the result that the visiting bears are concentrated in a comparatively small area near the ocean; and the gulls, ducks, eagles, and ravens, seeking the spawn or the remains of the fish that are carried ashore by the bears or by the current, create a scene of activity very interesting to the visitor, whether he comes armed with a gun, with a camera, or with a field glass.

The bird most active at the salmon streams was an old favorite of mine—the Bonaparte gull. These birds came from the tidal mud flats in flocks of a dozen or more, and each would hang suspended a few feet above a spawning fish. As the eggs were laid, the little gulls would plunge down with sufficient force to penetrate the water a foot or so, and thus obtain some of the eggs from the gravel bottoms. They would then retire to digest their food and prepare for another raid.

Once when the sun broke through the clouds for an hour, I made a brush blind at the edge of the stream and succeeded in getting a series of pictures of the diving birds engaged in a method of feeding I had never noticed elsewhere. Gulls usually find their food on or near the surface of the water.

That gulls in turn sometimes become the victim of voracious fish we noticed as our steamer passed along the coast near Ketchikan. Within 10 minutes I saw four gulls that were at rest on the water pulled,

struggling, beneath the surface. This would indicate a possible widespread destruction from a source that previously I had not seen or heard mentioned.

The almost continuous rainfall on Admiralty Island was in striking contrast to the bright, dry weather we had enjoyed on the Kenai Peninsula two years before, when in more than a month we had only one brief shower. The explanation I worked out for the almost incessant downpour may account for the situation.

Practically every day we could see rifts of sunlight a few miles back of the main shore. There the currents of air evidently flowed upward on account of the heat of the sun on the land. This upward current drew in the moist air from the ocean, which in passing over the mountains of Admiralty Island had its moisture condensed and precipitated in rains.

The low and even temperature day and night on the island was due to winds off the ocean. Whenever heavy winds blew in from the Pacific, the rains increased in volume and fell night and day. The few times the wind came from the mainland, or blew up and down the coast, we had lighter rainfall and warmer weather.

This seems to corroborate my theory, particularly since there was usually less rainfall after sundown. The weather from day to day from this time forward is recorded mainly in my son's diary, for he bore the brunt of many hardships while hunting persistently regardless of weather conditions.

The photographer of the party being weather bound most of the time, it fell to the lot of my son to supply the most interesting events of our outing. Rain could not prevent hunting deer, bears, and wild fowl. The following extracts from his diary tell the story of his hunts and how they resulted.

DIARY OF ADMIRALTY TRIP BY
GEORGE SHIRAS, 4TH

"September 1.—We left Juneau about 9.30 a. m. and decided to go all the way to Pybus Bay. The day was beautiful, and we enjoyed the trip very much. Arrived at Pybus Bay, 9.30 p. m., so late and it was so dark that we pitched only one tent and slept four in a row, Hasselborg staying on his boat.

"September 2.—It was a fine day. About 9 a. m. Hasselborg and I went out after



CHARLIE ANDERSON BRINGS IN A GOOSE

The camp table was well supplied with game of many different sorts.

deer. Through the field glasses we saw some browsing on the mountain slopes, but first we tried for a shot at one in the small lowland meadows. We saw no fresh signs there, so decided to climb the nearest mountain. It took about two hours to reach the top, where there was an irregular plateau with little meadows at slightly different elevations and numerous small ponds.

"Finally we spied a deer feeding on a slope, but could not determine whether it was a buck or a doe, for we had left the field glasses at camp. We were out mainly after camp meat, but did not wish to shoot a doe. After going a few hundred yards farther, we made out a deer across a gully. I raised the sights for 200 yards and fired, but the bullet went high.

"About 1 o'clock we turned back for camp by a way different from our route up the mountain. My shoe packs were too large, and this made awkward going for me on steep slopes. In places it was so steep that it was impossible for me to retain my foothold and I would slide 15 or 20 feet at a time, clutching wildly at the bushes as I went.

"In places here and there the slope dropped away sheer for from 150 to 200 feet and we had to work cautiously around these cliffs. This was nervous work for me, unaccustomed as I was to mountains and having on utterly unsuitable footgear. At the bottom we forced our way through tangled bushes and found ourselves on the shore of the little cove near the mouth of which camp was located. The cove is an arm of Pybus Bay, and is about half a mile long.

"The tide was high, and we had to force our way through the dense vegetation bordering it, making only about 300 yards in an hour. Hasselborg reached camp well ahead of me, and Charlie came to meet me about 3 p. m. and took me back to camp in the small boat.

"After having something to eat, Charlie and I took the boat out to try for ducks. We had no success in our search for ducks, but we saw a few geese too far away to warrant shooting at them.

"September 3.—I had planned to climb the mountain again today, but rain in the morning prevented this, and Charlie rowed me across the cove to look for bears. Many salmon were in a small stream there, and plenty of bear signs were along the banks.

It appeared that I would probably be as successful in getting a shot at one of the animals by quietly waiting where signs were plentiful as when moving about. Soon a bear was heard making a great noise in the thickets to our left—possibly two cubs fighting—but nothing appeared. Nearly an hour later another was heard much closer and near the stream, but it also failed to come into the open.

"About 7 p. m. we decided to return to camp, and were startled to discover that the tide had run down until it had left our boat stranded several hundred yards from the water, although we supposed we had left it in a place safe from such a mishap. Fortunately, we had to drag it only about 70 yards to a little drainage way through the tide flat, which enabled us to reach open water without great exertion. It was practically dark when we reached camp at 8 o'clock. Our only game for the whole trip was a single teal.

DIFFICULT COUNTRY

"September 4.—Left camp with Charlie soon after 5 o'clock, and we began climbing the mountain slope very soon instead of waiting until we came to a long ridge that, as we learned later, made an easier way. The slope was exceedingly steep, and we had literally to pull ourselves up by our hands, as in a prolonged 'chinning' exercise, using our feet mainly for toe-holds. After about an hour of this going, the difficulties were increased by a dense growth of scrubby alders and devil's club, and loose stones under foot. Here Charlie was



A WISE OLD RAVEN INSPECTS THE CAMP

These birds were common about the shores of Admiralty Island. In summer they feed largely on dead salmon along streams.

ahead, and several small boulders started by him barely missed me as they fell.

"Suddenly an extraordinary commotion began above me. It seemingly was made by a combination of snorting, growling, and hissing sounds from some big animal. Accompanying it sounded the cracking of branches and the rattle of rolling rocks, which began to pass me. It was evident that Charlie had started a bear in my direction.

"As I cocked my rifle, Charlie shouted for me to get my gun ready. Then the bushes began to move and I could hear the bear going away to the left. The bushes were so dense that I could not get a glimpse of it, although it was very near. If I had not called in reply to Charlie's warning,



A NEW SPECIES OF BIG BEAR (URSUS SHIRASI)

This huge beast was encountered in the brush and went down under some well-directed shots by George Shiras, 4th. Because of the reflection of the light from its glossy hairs the animal appears somewhat gray, but in reality it is dead black. In coloring it shows strong contrast to the big brown bears also found on Admiralty Island and previously supposed to be the sole occupants of the bear family there.

the bear would have come directly down upon me.

"An extremely awkward situation would have been the result, for I could not have seen the creature in the brush until it was fairly at the muzzle of my gun, and whatever the result of the shot, we should have pitched down the abrupt mountain slope together. I had been told by bear hunters that these animals, when alarmed, always go up the slope. Consequently the course taken by this animal at first surprised me. A few minutes later we found immediately above us an overhanging cliff; it became evident that the bear was cornered and forced down.

"About 9 o'clock we came to the mountain top. A spike-horn buck dashed from the cover on my left, and I missed him at

40 feet. He stopped a moment at the crack of the gun, but was gone so quickly there was not time for a second shot. We saw no more deer, and about 11 o'clock we began our return to camp.

BAD WEATHER MADE HARD HUNTING

"For three days the rain had fallen and the brush was soaked. All this morning the rain had continued; we had become wet to the skin soon after we started out. The constant exertion of climbing kept us warm, but as soon as we stopped to rest for a minute we became badly chilled and our teeth would begin to chatter despite every effort.

"Being unfamiliar with these mountains, we descended the wrong slope and struggled for five hours through a heart-breaking

tangle of dense brush until I finally became so exhausted that it was all I could do to break through the brush and fall over hidden logs. Whenever we paused for a moment we became so chilled it was evident that if we failed to make camp before dark our plight would be serious. We had neglected to carry our matches in a waterproof container and they were as wet as we were.

"At length we broke through the brush on the border of Pybus Bay, and there about 400 yards away was the welcome sight of Hasselborg's boat at anchor. Our relief was tremendous. Six hours after we left the mountain top, we were in dry clothes before the camp fire enjoying a fine, hot clam chowder. Father and Hasselborg had become uneasy about our prolonged absence and were out looking for us when we came in, but a rifle shot in the air brought them back.

"September 5.—None the worse for yesterday's strenuous 11 hours on the mountain side, I remained in camp part of the day and went out for shore birds with father. It did not take long for us to obtain a bag of 17, all we desired, consisting largely of surf birds and black turnstones. Hasselborg and Charlie went up the mountain for deer by an easier way, but failed to get one. Rain all day.

"September 6.—In the morning the rain stopped for about five hours and then began again. Hasselborg and John looked over the set cameras, but found none of the flashes fired, although the bait had been taken at one place. The cameras and flashlight apparatus are covered with waterproof material, but the steady downpour of rain has spoiled some of the flashlight powder. I fear the general moisture will spoil the plates, but the cool temperatures may save them.

A WET CAMP

"In the afternoon Hasselborg went out with me for ducks. I killed three, but lost them in thick grass. We were thoroughly soaked by the rain, as were also father, John, and Charlie, who were out for a time. It is fortunate that we have a small stove in the cook tent; otherwise our situation would be hopeless. Most of our things are wet all the time and we lack enough changes of clothing. Waterproof articles in such a situation give much trouble, for they are difficult to dry.

"September 7.—Rain continued all last



THE FEET OF THE SHIRAS BEAR

These were cut off to be presented to the museum along with the head pictured on page 437.

night. The tent leaks in a few places only, but wet some of my possessions including my diary in which these notes are being recorded. My sleeping-bag rested in a pool of water, but the dampness did not penetrate to the blankets inside. In the afternoon Charlie took me out for an hour in the small boat after geese, which we failed to get, since they flew when we were too far away for my shot to be effective.

"I took the rifle and went across the bay to look for bears. As we were about to land, the wind became almost a small tornado, blowing great rain-laden gusts across the water. It did not look promising for bear hunting, and we returned to camp.

"September 8.—After breakfast at day-break Hasselborg and I started out for deer. We went in his launch to another cove near the head of Pybus Bay. After landing, we at once climbed a mountain. At the top were a doe and a fawn, which stood looking innocently at us. We were out for camp meat but did not wish to shoot anything but bucks. We whistled and they bounded away. Two other deer were seen that did not afford good shots.

"After eating some sandwiches in the downpour, we continued our hunt along the ridge. We walked some distance apart and Hasselborg saw 14 deer and I counted 10, with not a single buck in the lot. Finally we were forced to give up our search for a buck, and took into camp the meat of a doe and a fawn. Meanwhile Charlie had



YOUTHFUL REPRESENTATIVES OF THE NEW BEAR (*URSUS SHIRASI*)

Photograph courtesy Nature Magazine

This picture of two-year-old twins shows them at the edge of a salmon stream. Their noticeably dark colors contrast with the light yellowish brown of the huge bears that previously had the island as an exclusive family home.

killed a white-cheeked goose and a willow ptarmigan.

"September 9.—Early in the morning Hasselborg and I crossed to the other side of the bay. To our pleased surprise it was not raining, and I took some photographs of gulls and of the mountains. Through the glasses we saw deer on the mountain side, which we hoped were bucks. When we stalked within gun-shot, however, they proved to be does, and we went on.

"On the way up we came within 25 feet of a small buck with rather good antlers, but I refrained from shooting it when Hasselborg assured me that I could get a much better one a little later. I took three unsuccessful shots at an albino buck that was with several other deer across a small valley. It was raining hard at the time and my shots all went high. In our wandering over the mountain today we walked within a short distance of between 15 and 20 deer, all does except two spike-horn bucks. Not a single fawn was in sight.

ENCOUNTER WITH A BEAR

"From the foot of the mountain we followed down a small salmon stream and encountered a big brown bear fishing. He was on the right bank looking up and across at us. Dropping to one knee I took careful aim at the middle of his neck and fired. He immediately fell on his back and rolled over and over several times, roaring and bellowing with rage and pain.

"Hasselborg shouted, 'He's a dead bear'; then, 'Shoot again.'

"Just then the bear regained his feet, and as he rose I fired at his shoulder. Off he went up the bank to the right, continuing his roars. I should have shot again, but felt confident the two shots already given were enough. Down by the stream where the bear had been shot there was much blood on the bank, and the leaves and ground where we trailed him were covered with it.

"The brush was so dense that it was necessary to follow the trail cautiously with rifles ready for instant use should our victim rise suddenly before us. Finally it began to grow dark and Hasselborg assured me that the bear was so badly wounded that we were certain to find his trail easy to follow in the morning. Rain was the only thing to fear, and the stars were shining. Never before in my life had I such an intense desire for no rain.

"September 10.—It began raining about midnight, and in the morning we found the blood along the bear's trail all washed away except here and there on the underside of devil's club leaves. The trail led us to another stream where, despite all our efforts, we lost it completely.

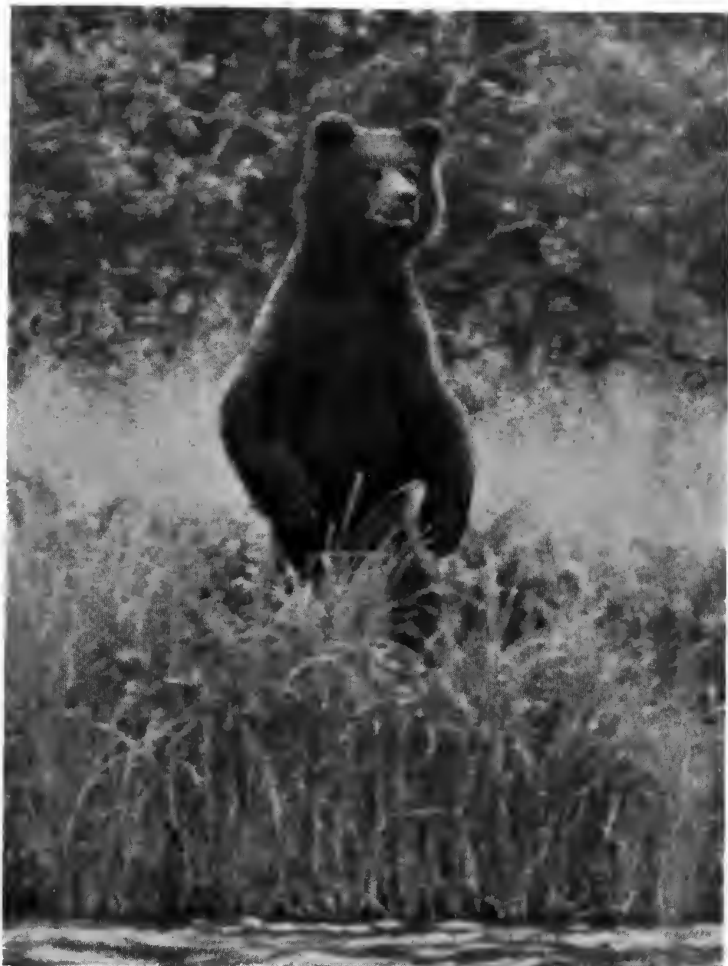
"September 11.—Last night the rain fell more heavily than ever before at our camp, and in the morning my sleeping-bag had a good-sized pool in a depression on its top. The thermometer usually registered 52 degrees but one morning it showed 49. One advantage of this coolness here over the warmer Copper River camp is the absence of black flies and mosquitoes. Although I wear a waterproof hat, slicker, and rubber boots here, I become soaked with water every time I go out, but we find game. Our cook serves us venison, geese, ducks, shore birds, blue grouse, and ptarmigan.

"This proved to be the stormiest day we have experienced, with a heavy northeaster. Hasselborg kept under cover on his boat and the rest of us remained in the tents. When I started to get into my sleeping-bag, I found the blankets soaking wet. During the hard downpour of the day the tent had leaked a steady stream, and the water had entered the opening of the bag. Taking it over to the really waterproof cook tent, I spread my slicker over the bag and crept into the soggy mess, but did not enjoy a very good night's rest.

"September 12.—Father, Charles, and I went to the lower bay, from which father and Charles returned to camp in the small boat, while the launch was anchored and I walked up the salmon stream with Hasselborg looking for bears. From an open place up over the mountain slope I caught a glimpse of the albino buck. On our way back to camp we ran upon a reef but without damage and arrived before 5 p. m. This has been our first day without rain here.

RAIN AND FOG AGAIN

"September 13.—At 9 o'clock last evening began a steady rain that continued all night. During the entire day the mountains back of us were lost in a heavy bank of fog, and it was necessary for Hasselborg and me to abandon our proposed hunt on them. For a while in the early morning Charlie went with me to the salmon stream. I walked ahead looking for bears, and he followed with a rod fishing for trout. We saw some fresh bear tracks, some salmon



Photograph courtesy Nature Magazine

URSUS SHIRASI STANDS AND ANNOUNCES HIS PRESENCE

In the summer of 1933 Mr. Arthur N. Pack, at the head of an expedition, visited Admiralty Island to study and photograph the great brown bear and especially a black phase of this animal described and named *Ursus shirasi* by Dr. C. Hart Merriam many years before (see text, page 437).

working up the stream, some gulls, a pair of harlequin ducks, and a merganser, but obtained no game. The trout refused to take flies or bait made either of salmon meat or of eggs.

"September 14.—Hard rain all night. The tent leaked badly and in the morning I was awakened by a splash of cold water on my face. I discovered that water had been falling on me until my head and shoulders were very wet, and water had penetrated to the middle of the sleeping-bag. Although very wet, I was comfortable enough, for the blankets had held the warmth of my body.

"About 9 in the morning, Hasselborg set out with me in a hard rain after bears. I wore my rubber boots and a slicker that had become badly torn and had lost all but the top button. We circled around the base of the mountain back of camp and were following down a large salmon stream when we saw a big brown bear in the water with a fish held crosswise in its mouth. I crept to within 100 yards of it and opened fire; the first two shots were high, but the third hit it in the rump.

"To my surprise it gave a jump and tried to climb a tree beside it. At least it stood up full length and appeared to be doing its best to climb. At this time another shot struck its right paw, and dropping to the ground it disappeared so quickly I could not get another shot. Hasselborg crossed the stream on a wet and slippery log, but in trying to follow I slipped off into the

water. Fortunately it was only up to my waist, but the current was so strong it nearly carried me away.

"The bark of the tree that the bear tried to climb showed deep claw marks, and blood was on the tree trunk and on the ground at its base. We trailed the bear a long distance, here and there finding much blood and then for a considerable distance no sign of it. In places the signs indicated that the bear had started to lie down and then our scent or the noise of our approach had sent it on again.

"The trail led us along a crooked route through the dense brush. It was completely

lost on the bank of a creek. On our way back along the trail we found that the rain had already washed away all trace of the blood.

"We arrived at camp at 5 o'clock, wet through, cold, tired, discouraged, and hungry. After a hearty meal of roast goose, boiled potatoes, apple sauce, prunes, and rice pudding, with two cups of coffee, I felt more cheerful and began to think that I might yet get one of these elusive bears.

"September 15.—Heavy rain fell all night, and our tent leaked so badly that I carried my sleeping-bag over to the cook tent and laid it beside the guides. There I appreciated a dry night. Nothing worthy of record today.

GETTING A BIG BEAR

"September 16.—About 9 o'clock Hasselborg and I began another bear hunt. We went up the basin at the foot of which our camp is set, and then up along the salmon stream, passing the place where, on September 14, I had wounded the bear. Above this we came to some beautiful waterfalls.

"As we were climbing along the slope through dense alders, I heard a stick break directly to my left and below. At this instant Hasselborg beckoned and in about two steps I was beside him, just as a big bear appeared about 15 feet below us. He turned toward us, apparently to learn what was making the noise near him, and I fired four shots into his side and rump, and one through the brush that struck him in the lower jaw. He went about 30 feet along the slope and was dead when we reached him.

"He was a large example of the big bears of this region, measuring 6 feet 8 inches from the tip of the nose to the tail. This is the only accurate method of measuring the length of a bear, for after the skin is taken off it can be stretched far beyond the length of the animal. His hind foot with the claws was 14 inches long, and his fore-foot 13 inches long and 7 inches broad.

"He was entirely black, but his fur was not in such good condition as it would have attained in another month. After disemboweling him, we returned to camp to wait until tomorrow before preparing the trophy. During the day father and Charlie had been out for surf birds and black turnstones, minute game as compared with mine; but these certainly made delicious additions to our camp fare.

"September 17.—In the morning father, Charlie, Hasselborg, and I went up to the dead bear. The head, cape, and front feet were removed and taken back to camp by father and Charlie, while Hasselborg and I continued on to the big mountain beyond the ridge lying back of camp, a trip that we had been planning for days.

"After leaving the carcass of the bear, we had climbed about 2,500 feet when a buck with a fine pair of antlers appeared about 100 yards up the slope. I was so completely out of breath that my first shot was a clean miss, and my second caught him in the hind quarters. Steadying down somewhat I tried for his shoulders, but hit his neck. Still another struck him back of the shoulders. At the last shot he dropped on the steep slope and went rolling over and over until he disappeared.

"Leaving him to be found on our return, we continued on our way. It was hard labor to force a way up through gnarled alders and thorny devil's club with almost no foothold. Near the summit the bushes gave way to bare rocks and moss.

"This was the first entirely pleasant day since our arrival on the island, and the outlook from the summit was wonderful. All the surrounding region was visible, many wooded, mountainous islands, with Frederick Sound to the south, and a little patch of the open Pacific miles away through a notch in the distant mountains.

HARD WORK TO GET THE KILL

"The descent was difficult, and even dangerous in places, where it was all I could do to hold on above small precipices. The buck killed in the morning had rolled down about 500 feet and lay among some alders that saved him from a further drop of several hundred feet, clear. As it was, two prongs were broken from the antlers.

"September 18.—Last night the weather turned cool and this morning the temperature stood at 40 degrees. Hasselborg took my bear head on his boat to clean it for preservation, and I put in the time alternately watching him and reading parts of Sheldon's account of his hunt on Admiralty. Later, on a walk up to some ponds at the head of the cove, I flushed four mallards.

"Charlie returned early in the afternoon from a fishing trip with five fine trout measuring from 15 to 20 inches. The large ones appeared to weigh about three pounds. Hasselborg calls them "sea trout," but they

are probably what are usually called salmon trout. In a general way they resemble big brook trout, but their backs are darker—almost black—and their tails are slightly forked instead of being cut straight across at the end. The meat was firm and pink.

"Charlie had landed and fastened his boat at low tide and when he returned from fishing up the stream he found the water so high that the boat was inaccessible. He was forced to return to camp on foot along shore, wading in some places up to his waist. It was foggy all day and rain began again in the afternoon.

"I have been feeling a little off for the last two days. On Saturday Charlie and I went out after geese in the pouring rain, but on the way I was taken with a chill and we had to turn back to camp. The sea was so rough that it was all Charlie could do with the oars to make camp."

THE AUTHOR RESUMES HIS NARRATIVE

One afternoon in camp we heard several shots in rapid succession well up on the mountain side where George and Hasselborg had gone hunting bears. Upon their return later it was apparent at a glance that my son had been successful. He had killed an old male of the big black-colored animals which we had been seeing but which previously had been unknown to Hasselborg.

Early the following morning the camp was astir, and we set out for the scene of the previous encounter. Fortunately, for the first time in many days, the morning was clear and favorable for photography. The walk up the forested valley was fairly easy along the trails made by bears in summer and deer in winter. These trails made convenient passageways through a dense undergrowth of matted brush and prickly devil's club. A dry creek bottom led us up a ravine for about a quarter of a mile to within about 10 steps of the bear's carcass.

We soon formed an interested circle about the great black form where it lay in a dense mass of alder brush. As we came to the spot we were put on the alert by the sound of breaking bushes as a heavy animal plunged down one side of the ravine we had ascended. It was apparently another bear, but probably not the mate of the dead animal. Bears do not mate permanently. Many ravens were gathered in surrounding treetops waiting for the feast

in store for them. After clearing away some of the undergrowth, I took photographs of the bear from several angles.

Several characteristics of this big bear impressed me as I saw it in the flesh—its large size, its glossy blackish coat, the exceptionally broad skull, and an uptilted muzzle with a porcine cast as if it was built for rooting out mice and turning over sod and earth in search of roots.

Although there were five of us, we had difficulty in turning over the body so that the skin of the head, neck, and back could be removed. We took the skull for scientific study and the front feet as trophies. When this had been done, George and Hasselborg went up the mountain to try to get a fine buck that had been seen the day before, and the rest of us, carrying parts of the bear, made our way back to camp.

We were rather uneasy as we descended the ravine near the route followed by the bear earlier in the morning, for our only equipment consisted of a hatchet and a small camera. In the abstract we know that even the biggest and fiercest bears are slow to attack man unless wounded or cornered, or in defense of their young; but while we were unarmed, in the midst of the dense growth harboring such great beasts, we might be forgiven for having had the feeling that morning that we might prove victims to the exception that proves the rule.

Hasselborg told us that if we would return to the bear's carcass in a week or so we should find it buried under broken branches, roots, sod, and rocks. He had previously pointed out several mounds where lay bodies of bears he had killed.

HASSELBORG'S BEAR CEMETERY

I had seen on various other occasions the temporary caches of meat made by bears and other predatory animals. These mounds on Admiralty Island were larger and flatter than a beaver house, and had well-marked trails about them.

These, Hasselborg solemnly assured me, represented a ceremonial custom of burial quite apart from any food-storing habit. He said that for a year or more these places would be visited by the bears. This weird tale of prolonged mourning by bears was not well authenticated by several of the mounds that I examined. They contained only the bones of deer and evidently had been food caches.



HEAD OF THE NEW BEAR, *URSUS SHIRASI*, FROM ADMIRALTY ISLAND, SHOT BY
GEORGE SHIRAS, 4TH

This animal measured 6 feet and 8 inches from the tip of its nose to the root of its tail. The forefeet, skull, and skin are now in the Biological Survey Collection in Washington, D. C. The tail-piece used at some chapter ends is from a drawing of this trophy by Hashime Murayama.

For the sake of continuity I will introduce here the information we received after our return to Washington. The skull, skin, and front feet of the bear shot by George had been submitted to Dr. C. Hart Merriam for examination. Doctor Merriam compared them with the unequalled series of Alaskan bear material in the Biological Survey collection and decided that our animal was an unknown species. Under date of July 1, 1914, he wrote me in part as follows:

"Your bear turned out to be a splendid new species, which it has given me pleasure to name *Ursus shirasi*. We previously had several young specimens of it but none old

enough to show the adult skull characters. Since you were here, two additional older specimens have come in, one not quite so old as yours, the other very much older but smaller. Your specimen I have made the type of the species to remain in our National Collection for all time as the unit of comparison for this bear. It is a great pity that the skin and claws could not be preserved with the skull to show their distinctive characters. However, I appreciate your desire to keep the mounted head as a trophy. If you do not need both of the fore feet we should be mighty glad to have one of them for the collection in order to prove by the claws as well as the skull that

Ursus shirasi is a Big Brown Bear and not a Grizzly."

Doctor Merriam published a technical description of this bear on page 195 of the *Proceedings of the Biological Society of Washington*, issued August 13, 1913. In this the animal is described as entirely black except for the full brown muzzle and a brownish wash along the middle of the back.

He adds: "*Ursus shirasi* is a very large member of the Brown Bear group. Whether or not it is always black, like the type specimen, is not known. But of all the American bears it has a skull the most striking and distinctive. The short, broad frontal shield rising on each side into huge postorbital processes which arch broadly over the orbits serve to distinguish it at a glance from all other species, rendering close comparison unnecessary.

"In this connection it is interesting to observe that *shirasi* and its neighbor *eulophus*, an inhabitant of the same island, present opposite extremes of departure from the normal ursine type—*eulophus* having a long narrow skull with slender elongate rostrum, long and narrow frontal shield, and insignificant postorbital processes, while *shirasi* has an exceptionally broad skull, with broad short rostrum, excessively broad and short frontal shield, and huge massive postorbital processes."

LATER REPORTS CONCERNING THE BEARS OF ADMIRALTY ISLAND

After some twenty years, another expedition under the leadership of Mr. Arthur N. Pack visited Admiralty Island for the purpose of studying and photographing the Great Brown Bear or any new form of the same. Mr. Pack was successful in getting a fine series of the island bears in the vicinity of the streams where the salmon spawn. It is a pleasure to note that pictures of the black-garbed ones predominated in his collection.

In the origin of species, it has long been recognized that where wild animals are confined on a large island inaccessible from the main shore there is often presented a favorable opportunity for any abnormal offspring to develop permanently into a newly established form. This appears to have happened on Admiralty Island.

I am glad to welcome Mr. Pack into the ranks of those who successfully hunt with the camera, and to express my appreciation

for the use of several of his pictures, which will greatly aid in establishing the origin and history of this newcomer among the giant bears of Alaska.

In addition to the several species of gulls, heretofore mentioned, and the mallards, and Canada geese in the fresh-water ponds near camp, I had a chance to observe a number of other aquatic birds in the bays and channels of the western side of Admiralty Island. Among these were the red-breasted merganser, and the bald-pate, the pintail and both species of scaup. In some of the narrow channels were golden-eyes and buffleheads.

WATER BIRDS ABOUT ADMIRALTY ISLAND

Further out from shore were old-squaws, whose varied and penetrating notes reminded me of winters spent on Long Island Sound. Numerous but more or less separated were white-winged scoters and surf scoters, which in the spring gather in large flocks. Near rocky islands and reefs, out toward Frederick Sound, were many scattered harlequin ducks whose brighter plumage was in contrast to the other deep-water ducks of this region.

Because of the warm waters of the Japanese current along the shore and about the islands of southeastern Alaska many of the wild fowl, including even hundreds of mallards, remain in the open waters throughout all, or the greater part of, the winter. At the time of our visit to the island the shore birds were moving southward and, in addition to the surf birds and black turnstones, so numerous in Pybus Bay, I saw a few yellowlegs, northern phalaropes, and two or three species of sandpipers. In flight I also noticed semi-palmated plover and black-bellied plover, as well as a small flock which looked like the Pacific golden plover, but which were too distant for certain identification. One evening a small flock of little brown cranes passed overhead, their loud croaks attracting my attention skyward. These birds, however, were flying northeasterly instead of south.

Usually the man who hunts birds with the camera has a decided advantage over the gunner, for he can see many species that nature did not design to be served on the table. On Admiralty Island, however, the reverse was true. With the skies almost continually overcast and the air filled with rain or fog, I had little chance to picture the birds on or about the island. Many of



DESERTED TRAPPER'S CABINS AFFORD TEMPORARY LODGING

During the return of the author and his party from Admiralty Island to Juneau a severe storm forced them to take refuge on a small island for two days. There they were fortunate to find good shelter awaiting them.

these appeared on a different kind of plate, where a knife and fork instead of developing powder came into use.

A great comfort during the almost continuously bad weather was our use of the so-called gunny-sack camp beds, described in the previous volume. It may be restated that this light and convenient bed consisted of a 6 x 3 foot canvas bag open at each end, through which ran supporting saplings nailed or otherwise fastened on logs at each end of the bed. It mattered not whether rain made its way beneath the tent or covered the floor cloth with puddles from a leaking roof, we were elevated above these troubles, and with a waterproof sleeping bag on each of these cots escaped the hardships of a bed on the floor (see Volume I, page 167).

The large camp umbrella, so seldom seen in the wilderness, was also particularly useful on this trip. At mealtime it was suspended over the kitchen fire whenever it rained, thus sheltering the attendant and the cooking utensils and providing a service that would otherwise have been extremely difficult.

On several occasions this umbrella, which

was made of dark green waterproof canvas, was suspended from a lower limb of a tree by a cord running to a ring at the end of the shaft. Here, beneath the dripping trees along the banks of a salmon stream, I could watch for bears or feeding gulls with myself and camera amply protected.

RETURN TO JUNEAU WAS ACCOMPLISHED UNDER DIFFICULTIES

September 20 ended our stay on Admiralty Island. Although we have been beset by almost continuous rain that interfered seriously with my photographic work, the conditions as a whole were so novel and interesting that both George and I have greatly enjoyed the experience. Soon after we put to sea a severe storm of wind and rain forced us to run for the nearest shelter on a little wooded island, on which we could see the deserted hut of some Indian fisherman or trapper. The island was only about 350 yards long and gave no safe anchorage for the launch. After landing the four passengers with their bedding and provisions, Hasselborg went on to seek refuge behind some sheltering point along the nearby shore of the main island we had just left.

On September 21 the sea and wind had subsided and, according to our agreement with Hasselborg, we were on the beach very early in the morning with our outfit packed and ready to go, but he failed to appear. We waited impatiently for him until, finally, in view of the favorable weather, we feared he had suffered some mishap. Charlie and John passed some hours in the afternoon in the small boat looking for him, but without success.

HASSELBORG TAKES HIS TIME

There was no sign of the launch the morning of September 22, and later in the day the guides again set out to search for the missing boat. Just at sundown we heard the welcome chugging of the exhaust, and the launch appeared with our men on board and their boat in tow. When we expressed to Hasselborg the anxiety we had undergone because of his delay in returning, he said that he did not suppose anyone was so interested in his welfare. We made it plain that our anxiety had more to do with our own situation. The only reason he gave for causing us to lose two fair days was that it was too rough for the return trip. This is an example of the curious and often irritating difficulties of exploration.

The next morning in the face of an increasing wind and rain we made an early start from our little island of refuge. Before we had gone far, the engine suddenly stopped and the boat rolled so heavily that the necessary adjustments to start the motor again were made with much difficulty. The little launch, only 27 feet long, was badly overloaded with four passengers and several hundreds of pounds of cargo, besides some heavy timbers which Hasselborg had cut while held up by the storm. The timbers were for use in a new boat he was building.

The launch was clearly so overloaded that I was doubtful about the outcome if the engine should give out when we were farther out in the open water. When I suggested a possible return to our camp site on Admiralty Island not many miles away, where we might await better weather, Hasselborg laughed and said, "We've got to meet our fate sometime, so why worry?"

As the waves increased in force, the launch labored so heavily that it became necessary to put overboard our two small boats fastened to a tow line. Hasselborg said that if the sea became too rough, he would cut them loose. This idea failed to

appeal to me very much, for if the poorly balanced and heavily rolling launch should turn over, as it seemed inclined to do now and then, we should be without any means of escape. When we were midway in the open passage, the steamer *Northwestern*, on which we were to go south on her return to Juneau, passed on her way to Seward.

I must confess that I had a great desire to be on board her; for just at that time our tow line broke and it was necessary for the launch to make a wide circle amid the breaking waves to recover the boats. Finally we secured the line and entered the shelter of a little bay to readjust it just as the engine stopped again. It required four hours of hard work by Hasselborg to repair it.

Had the accident occurred half an hour earlier, while we were in the open sound, it is doubtful if the boat could have survived until the repairs were made. It is needless to say that all the members of our party were much relieved when we finally came alongside the wharf at Juneau, although Hasselborg had appeared quite unconcerned at the time. He had the reputation of being a very skillful, but exceedingly eccentric guide, and this was demonstrated especially during the last part of our expedition.

THE SITKA BLACK-TAILED DEER

The coastal islands along the panhandle of southeastern Alaska are inhabited by a small and dark geographic race of the well-known black-tailed deer of the wooded northwestern coast region of the United States and British Columbia. In comparatively recent years these small deer have been introduced on a number of islands along the southern coast of Alaska. On Hinchinbrook and Hawkins islands they have prospered and increased. They are reported also to have swum from Hawkins Island, lying west of Cordova, to the wooded adjacent mainland, and to be thriving there. Attempted introductions of these deer on the Kenai Peninsula and on Kodiak Island seem to be failures, so far as I can learn.

The abundance of these deer on the coastal islands of southeastern Alaska appears to vary greatly from time to time. In a series of favorable seasons they become very abundant, but one or two winters of unusually heavy snowfall may bury their forage so deeply on the abrupt slopes they



A WHALE ADRIFT ATTRACTS HUNGRY BIRDS

At a distance the author thought he was sighting a wreck, but nearer approach showed it to be a dead whale with a long shaft planted on top of it bearing a lantern and a small flag as finding and identification marks. Apparently it had been carried away by wind and currents until lost by the whaling ship to which it belonged. It was being escorted by a swarm of shearwaters, relatives of the petrels, intent on the oily food the carcass provided.

frequent that they cannot reach it. They then are forced down to the barren beaches along shore, where they try to sustain life by eating the seaweed exposed at low tide. This plant seems not to have any food value, and in such seasons so many deer perish from starvation that they are scarce for a few years following. They are so prolific, however, that a few favorable years result in their being as numerous as before.

One winter some years ago the Biological Survey, with the financial aid of the National Association of Audubon Societies, the American Game Association, and the National Humane Society, assisted by numerous Alaskans, provided hay along the beaches for the starving deer with such success that similar action continues to save hundreds of these animals from an unhappy fate.

From prehistoric times these little deer have been of the utmost value to the Indians along the coast they frequent. Their flesh furnished food, their skins clothing, and their sinews thread, and other parts of them served primitive needs in many ways.

The existence of deer on the southernmost Alaskan island accounts for the pres-

ence of the big, dark-colored timber wolves that swim the narrow channels separating certain islands from the mainland of British Columbia, which they cross from island to island. There they prey upon the deer, which constitute their main food supply—for rabbits and other game that are found on most of the mainland do not occur on these islands.

THE DEVELOPMENT OF ALASKA

On my two trips to Alaska I found great local enthusiasm over the proposed building of a railroad by the Government that would extend from the town of Seward, on the Kenai Peninsula, to Fairbanks, on the Tanana River, a distance of more than 400 miles. After making inquiries on the ground and giving the matter considerable thought, I failed to find any economic justification for such a heavy investment.

I had known for many years Franklin Lane, then Secretary of the Interior, under whose direction the road would be built, and after returning from my second trip to the Territory I felt so strongly on the subject that I went to see him regarding it. The project was then in a formative stage, and I gave the Secretary such information

as I had gathered bearing on the economics of the proposed road and strongly urged that he disapprove it and thus save a wasteful expenditure of public funds. My conviction was made plain that such a railroad could not pay its way, either when completed or at any future time, so far as could reasonably be foreseen.

The original incentive to build this railroad was the supposed value of the Matanuska coal fields. Later investigation proved this coal to have practically no commercial value on account of its being so thoroughly scattered by the seismic disturbances common in this volcanic region.

It was my opinion, as expressed to Secretary Lane, that instead of spending the great sum necessary to build the railroad from a small port on the coast to an even smaller terminal more than 400 miles in the interior, and the huge annual amount necessary for operating it, a part of the money could be used far more effectively in developing the Territory by properly surveying the coastal waters, to lessen the heavy toll in vessels and human lives under present conditions, and by otherwise improving the coastwise traffic. An extensive system of good roads for automobile and sled traffic could also be built wherever they were needed.

To these suggestions Secretary Lane replied that so much pressure had been brought to bear by Alaskans and by people from the northwestern States and elsewhere, who were personally interested in exploiting the Territory, that the building of the railroad had been forced upon the administration as one of its policies. At the time the railroad was being strenuously advocated the then Governor of the Territory declared that the building of the road would raise the population of Alaska to several million people.

THE ROAD A FINANCIAL FAILURE

The road was completed in 1923. It has since been operated at a heavy loss each year. The effect of the railroad on increasing the population of the Territory is best shown by the fact that in 1920, three years before the railroad was completed, the white population was 27,883, and in 1930 it is reported as being 28,640. These figures are from the census reports, and show that the white population has increased only slightly. The population of Seward and of Anchorage, at the southern end of the road, in 1930 was

835 and 2,227, respectively, and that of Fairbanks, the northern terminus, was 2,101.

These facts yield a striking confirmation of the opinions of those who opposed the building of the road on the strongest and most obvious economic grounds before the Government took any action in the matter. The outlook for the road at present appears to be hopeless so far as any adequate return on the investment is concerned. One bright spot in the situation developed by the building of the railroad has been the establishment of the McKinley National Park, which contains such a wealth of wild life and magnificent scenery that it should attract an increasing number of summer visitors.

LIGHTS AND SHADOWS ON ALASKA

In considering some of the economic conditions in Alaska the author has no desire to reflect upon the Territory and its possibilities, but wishes to express his friendly opinion on the subject. It is a fact that agriculture, except on a very limited scale, offers little inducement, for there is a lack of a large local demand for agricultural products and the cost of exporting any surplus and competing with products grown under more favorable conditions in the northwestern States is prohibitory. In fact, grain and vegetables grown in the State of Washington are sold at such low prices on the coast of southern Alaska as to make local competition difficult.

Another economic handicap is the absence of coal of a good commercial quality. In other directions, however, Alaska has valuable resources, such as its timber, favorably located on tidewater, its salmon and other fisheries, its reindeer herds, its fur bearers (including the fur seal), and its splendid game animals, as well as its gold, silver, copper, and other minerals. Last and not least is its unequalled combination of magnificent scenery, an asset of increasingly great value.

The greatest danger to Alaska's future is a tendency to exploit destructively some of its natural resources. It has required a constant war to save the fisheries from destruction. It has been difficult also to protect the game, and especially the fur bearers. Alaskans should bear in mind that visitors are drawn by scenic attractions and by hunting and fishing. With these assets properly conserved, Alaska stands potentially supreme.

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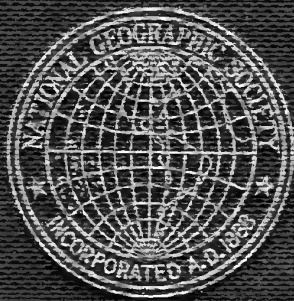
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